JOURNAL OF

The American Geriatrics Society

Volume IV *November 1956* Number 11

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Entered as second-class matter at the Post Office at Baltimore, Md. Subscription price $10.00 per volume. Published monthly.
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JOURNAL OF
The American Geriatrics Society

Official Journal of the American Geriatrics Society

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Subscriptions. The *Journal* is published monthly; twelve issues (Jan.–Dec.) constitute a volume. Subscriptions are sold on a volume basis, prorated if back volumes are not available. The subscription price is $10.00 per volume, plus $.75 per volume postage to foreign countries and the Postal Union, and $.25 per volume to Canada. Subscriptions for members of the American Geriatrics Society are included in the annual dues which are $15.00. Single copies, when available, are $1.25 per copy, plus $.25 postage outside the United States. Publisher must be notified 60 days in advance of change of address. Undeliverable journals will be destroyed.

Correspondence relating to remittances for subscriptions, back volumes and advertising should be sent to THE WILLIAMS & WILKINS CO., Mt. Royal & Guilford Aves.. Baltimore 2. Md.

All correspondence concerning editorial matters should be sent to: EDWARD HENDERSON. M.D.. 236 Midland Ave., Montclair, N. J.

Correspondence relating to remittances for reprints should be sent to the Waverly Press, Inc., Mt. Royal & Guilford Aves., Baltimore 2, Md.

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Malford W. Thewlis, M.D.
1889–1956

Malford W. Thewlis, M.D.
1889–1956

Doctor Thewlis, founder and permanent secretary of the American Geriatrics Society, died at the South County Hospital, Wakefield, Rhode Island, June 3, 1956.

Although he had not been in robust health following an acute illness contracted in Utah in 1954 whilst on his way to attend the eleventh annual meeting of the Society in San Francisco, his end, nevertheless, came as a surprise and shock to his many associates and friends.

Doctor Thewlis was one of the most diligent workers in the cause of geriatric medicine. With his friend, Doctor I. L. Nascher, he was a pioneer in this important branch of medicine. His textbook "Geriatrics—The Care of the Aged" was accepted as the standard work in this field. First published in 1919 this excellent book went through six editions, the last in 1954.

In addition to his classic textbook, Doctor Thewlis was also the author of "Preclinical Medicine," 1939, "Metastases, Medical and Surgical," 1948, and more than 100 scientific papers.

He was formerly Editor-in-Chief of *Medical Review of Reviews*, and *Archives of Therapeutics*. At the time of his death he was Associate Editor of *Medical Times* and a member of the Editorial Board of the *Journal of the American Geriatrics Society*.

In World War I he served as a captain in the Medical Corps, United States Army, seeing much active service in France with Field Hospital 165, Mobile Hospital 7 and Camp Hospital 115 on the Oise-Aisne, St. Mihiel, and Meuse-Argonne fronts.

He was Consulting Specialist in general medicine at the U. S. Public Health Hospitals, New York City; Special Consultant, Rhode Island Department of Public Health; and Consulting Physician, South County Hospital, Wakefield.

Those of us who worked closest with him for the good of the American Geriatrics Society will sorely miss his kindly, intelligent and generous approach to all of the many problems which beset an organization such as ours. He was always ready to devote his time and energy for the betterment of the Society. Indeed without his confidence, enthusiasm and love of the Society it is doubtful that we would occupy the prominent place in American medicine which we enjoy today. It will be quite impossible to replace him in our affections and exceedingly difficult to replace him as secretary.

Doctor Thewlis was born at Wakefield, Rhode Island, on December 4, 1889, the son of James Elmer and Viola Wilcox Thewlis. He graduated from the Bowdoin Medical School in 1911 and later pursued graduate studies at the Paris Faculty of Medicine. Here he studied under Regaud at Pasteur Hospital and Radium Institute and also worked with Babinski at l'Hôpital Pitié and with Gilbert at the Hotel Dieu. Although maintaining his permanent residence in Wakefield, upon his return from France he practiced medicine in Providence and later, New York City.

In 1940 he founded the Thewlis Clinic at Wakefield, Rhode Island, which was devoted exclusively to the prevention and treatment of disease in older people.

Malford Thewlis was a very modest, warm, scholarly New Englander with imagination, foresight, ingenuity and wide interests, both medical and civic. It is not surprising that while still in high school he set up a printing press in his native town of Wakefield and ran a successful business supplying handbills and other printing needs of his customers.

Those who did not know him well would not suppose that he was an accomplished magician, an interest which he maintained as a hobby throughout his life. During his medical school days he had cultivated and practiced this interest most energetically as his way of financing his medical education. A collection of newspaper notices from that early period indicates his prowess as a hand-cuff expert, "jail-breaker," and dealer in legerdemain as he covered his circuit from Brunswick, Maine to Kansas City. It will be pleasantly remembered that several years ago he was finally prevailed upon to participate in an entertainment in magic as the feature of the dinner of the annual meeting of the American Geriatrics Society.

He had had for a long time a scientific curiosity in regard to the interesting subject of graphology in its application to medical diagnosis. In 1945 he was co-author with Isabelle Clark Swezy of "Handwriting and the Emotions." It dealt with the correlation of handwriting with emotion and personality.

He was a member of the Washington County Medical Society, Rhode Island Medical Society, American Medical Association, American Geriatrics Society, American Graphological Society (President 1953), Society of American Magicians, and International Brotherhood of Magicians. Doctor Thewlis was a 32nd degree Mason in the Rhode Island Consistory, and a member of Palestine Shrine, Providence, Rhode Island.

He was married to Christiane Cherfils in Paris, France, on December 10, 1919. She survives him. Also surviving is one son, Harold Thewlis, an instructor of Government at the University of Connecticut.

EDWARD HENDERSON, M.D.

JOURNAL OF THE
American Geriatrics Society
Official Journal of the
American Geriatrics Society · American Therapeutic Society · Texas Geriatrics Society

VOLUME IV *November, 1956* NUMBER 11

THE MORE RECENT MANAGEMENT OF CHRONIC BRONCHIAL ASTHMA IN THE AGED*

FRED W. WITTICH, M.D.†

Minneapolis,‡ Minnesota

There is an increasing alertness to the problem of pulmonary insufficiency in chronic bronchial asthma in the aged. This condition is irreversible, important, and crippling, and is due to the development of complications in the older age groups. It accounts for the comparatively high death rate for asthmatic patients whose symptoms have persisted more than ten years. It is the purpose of this essay to indicate that, with proper application of the more recent therapeutic measures to these older distressed patients, it is possible for them to live longer, be more comfortable, and at times be relatively free from symptoms. The importance in childhood of sinusitis and such childhood infections as pertussis bronchopneumonia, recurrent attacks of acute tracheobronchitis, adenitis, and acute respiratory infections must be realized, for such conditions start the vicious cycle which progresses as life goes on.

The early recognition and treatment of nasal allergy, before asthma has developed, is an important element in the prophylaxis of asthma. According to Black (1), not more than 5 per cent of the persons over 50 years of age in whom dyspnea develops have bronchial asthma alone. Feinberg (2) states that about 2 million persons in this country suffer with asthma and that several hundred thousand of them are incapacitated.

In 1 out of every 3 persons with untreated upper respiratory allergy a progressive bronchospastic disease develops, either due to chronic bronchial asthma or to chronic pulmonary emphysema—conditions which pathologists link together. Many of those who have already progressed to a chronic intractable state can now be helped considerably as a result of our newer knowledge of the physiopathology of the progressive changes, the constant introduction of newer and better antihistamines, antibiotics, steroids and other drugs, and the improved measures for aiding pulmonary ventilation.

* Presented before the Annual Meeting of the American Geriatrics Society, Chicago, Illinois, May 3–4, 1956.

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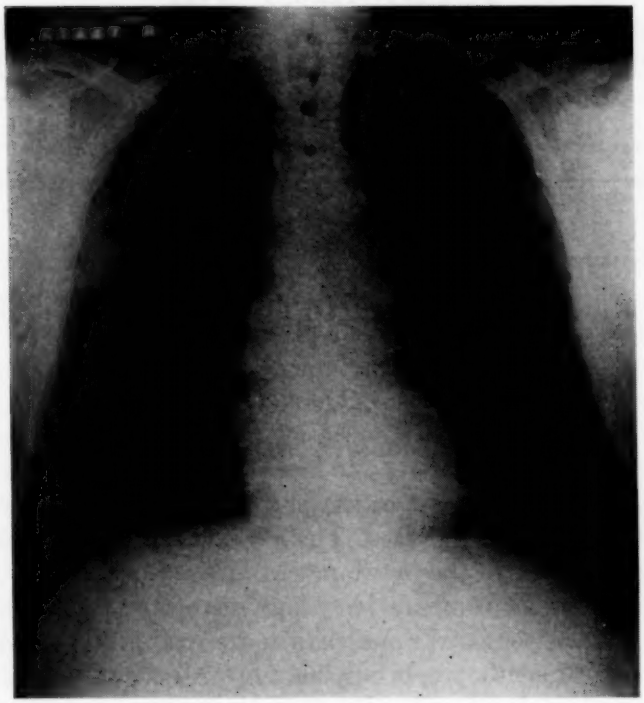

FIG. 1. Typical chronic intractable asthma. Roentgenograms of chest of male farmer, aged 56, taken April 15, 1952. The early attacks were recurrent, followed by chronic perennial bronchial asthma of fourteen years' duration. "Chronic emphysema with chronic interstitial lung fibrosis and basal bronchiectasis. Also localized areas of pneumonitis (infectional) with fluid pocket in right upper lobe, and bilateral diaphragmatic adhesions. Aorta shows some distortion with tortuosity, suggesting early senile changes."

CHRONIC BRONCHIAL ASTHMA

Prolonged bronchial asthma is the most serious of the respiratory allergies, because of its frequency, the crippling development of complications in the older age group, and the comparatively high death rate (Figs. 1–4). "Chronic degenerative diseases occur four times as frequently among the older age group as in the general population," according to Leonard Scheele, Surgeon-General of the United States Public Health Service. Respiratory conditions, mainly bronchitis, cause about 40 per cent of the infirmities of older people. Focal infections are a very important source of bacterial sensitization, as these foci can both cause and maintain a state of hypersensitiveness. Eventually, bronchospastic disease develops, due either to chronic bronchial asthma or chronic pulmonary emphysema.

Emphysema. The most vicious complication of chronic bronchial asthma is that of bronchial constriction. In time, whether this condition is caused by allergy (atopy) or whether it is so-called "intrinsic" asthma (the etiology of which is still controversial), it starts a chain reaction of pulmonary insufficiency (3) characterized by abnormal functioning of the alveolar ventilatory mechanism and progressive structural changes. These eventually lead to serious pulmonocardiac

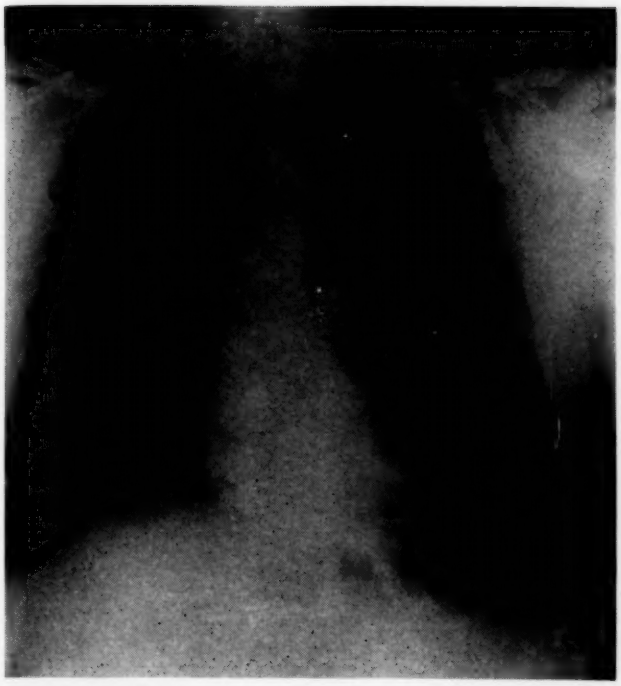

FIG. 2. Chest of patient represented in Figure 1, ten days later (April 25, 1952) following treatment with iodides, Osler's bronchitis mixture, Chloromycetin® and Terramycin®, Tedral® and aminophylline. Roentgenogram shows "partial resolution of areas of pneumonitis, both lungs, with possible slight resorption of the more generalized inflammatory changes as compared with last previous examination of April 15, 1952. Old fibrosis is not on a tuberculous basis. There is nothing to point specifically toward tuberculosis or malignancy." Supplementary treatment first consisted of cortisone, and later prednisone and prednisolone. Patient now doing light farm work.

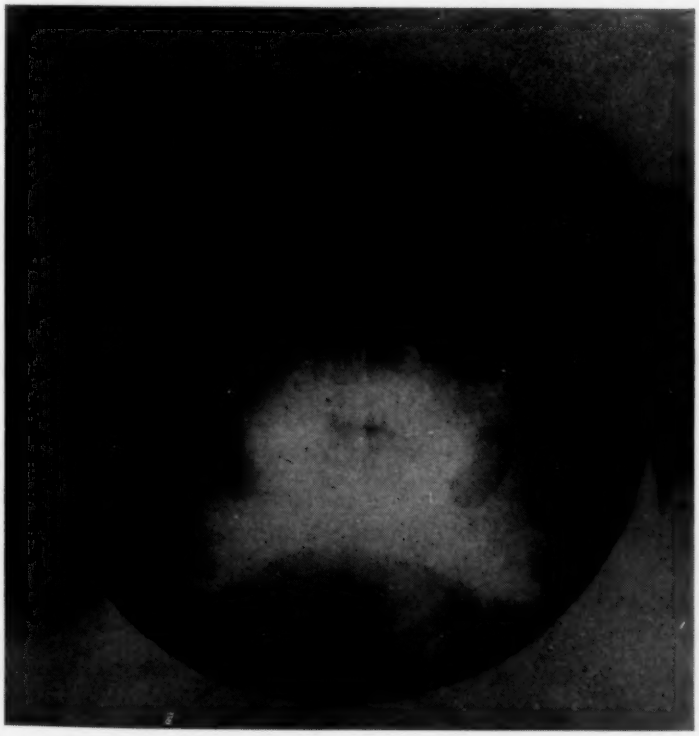

FIG. 3. Skull of patient represented in Figures 1 and 2, showing chronic hyperplastic sinusitis, right antrum and ethmoids.

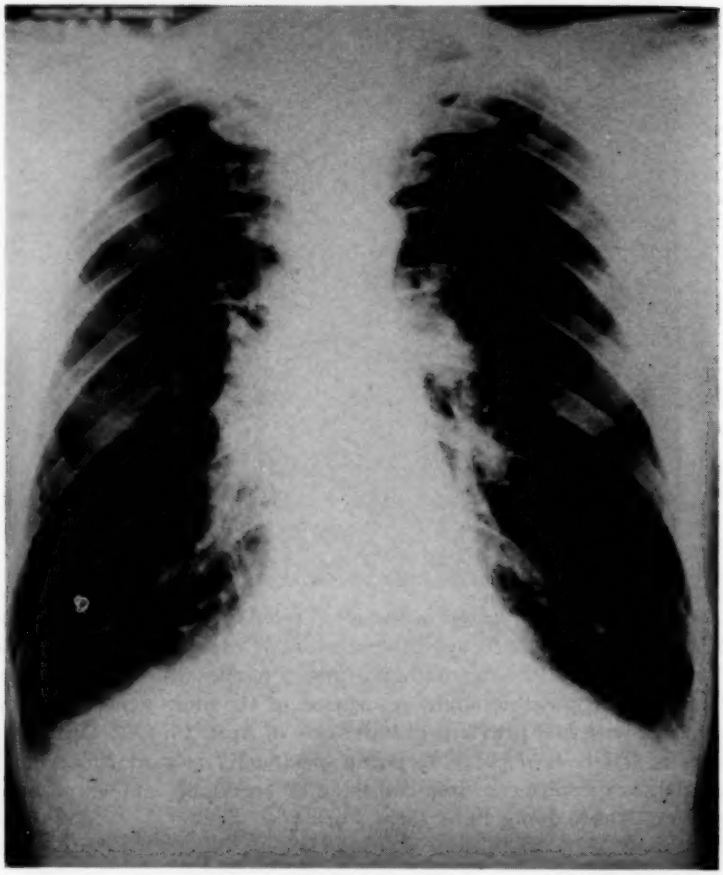

FIG. 4. Roentgenogram of chest of 61-year-old man (April 8, 1955), showing chronic bronchitis and bronchial asthma of about three years' duration, at the stage of pulmonary emphysema of fairly marked degree. Diaphragmatic adhesions. Chronic bronchitis.

complications, such as pulmonary arterial hypertension, chronic cor pulmonale and electrolyte imbalance. Continued bronchial constriction inevitably develops into a pernicious ventilatory insufficiency and hypoxia, if further increased by parenchymal atrophy, vascular obliteration and an accelerated aging process, along with chronic infection.

Improved therapy of these malignant changes requires a thorough understanding of their etiology, physiopathology, and the practical application of the more recent procedures to combat or retard their progress.

PREVENTIVE MEASURES

Obviously, if at the onset the acute paroxysms of bronchial asthma can be prevented or shortened, the development of emphysema can be made temporary. Patients who are taught the self-administration of epinephrine at the beginning of their frequent paroxysms are able to retard the development of emphysema. Irritation by smoking, particularly the constant smoking of cigarettes, is a common cause of obstructive emphysema. Recent investigations imply that

tobacco and other irritants cause the involved tissue of the upper and lower respiratory tract to age more rapidly than normal structures.

TREATMENT

Since emphysema inevitably follows chronic bronchial asthma, measures to treat the asthma are just as important as in earlier or periodic recurrent attacks. Elimination measures (outlined in standard textbooks), such as avoidance of known etiologic factors, offending inhalants and foods, should be undertaken. When possible, during exacerbations of symptoms, the patient should be in a hospital, so that studies may be made of the cardiovascular, pulmonary and renal functions, and the serum electrolyte levels, particularly those of sodium and potassium. These observations enable the therapist to modify or adjust therapy in the manner appropriate for the control of the developing complications.

Many of these patients have difficulty adjusting themselves to stress disturbances caused by a combination of psychologic and somatic factors. Early recognition and treatment of psychologic factors lessen the frequency and severity of exacerbations of the somatic factors and retard the progressive development of irreversible changes.

Specific measures

At times a renewal of specific hyposensitization measures is indicated, particularly where intrinsic factors are due to bacterial infection. Scrupulous dental care must be given these older patients, and if the tonsils are infected they should be removed. The incidence of sinus disease in "intrinsic" asthma is relatively high, and any treatment thereof should receive the attention of a rhinologist who specializes in allergy and whose views are conservative and reflect a reluctance to resort to surgery. An autogenous bacterial vaccine obtained from cultures of sinus washings is preferred, although a stock bacterial vaccine alone or combined with an autogenous vaccine sometimes yields better results. Regardless of immediate or delayed skin reactions to bacterial antigens, the only accurate criterion is a symptomatic reaction to as little as 0.0001 of 1 per cent suspension (4). Serial dilutions of such a stock vaccine are not given oftener than every five days, and the dosage, however small, is not increased following satisfactory results.

Every effort should be made to avoid some of the distressing episodes which may occur in the intractable asthma of older patients. When infection complicates bronchial asthma, a serious problem arises. Pus in the bronchi adds to the irritation; it is the main cause of the intractability and in many cases, of the development of fibrosis. Treatment is similar to that of bronchitis. In the beginning, and as time passes, the complications of chronic intractable asthma require a broad management aimed at retarding or controlling all of the developing physiopathologic factors. This consists of taking measures to control the ventilatory function, such as relieving bronchospasm, eliminating retained secretions, controlling infection, correcting hypoxia and disturbances of the acid-base

balance, and promoting diaphragmatic breathing to reduce hyperinflation of the lungs. Sequential discussion of remedial measures follows.

Drugs and other nonspecific measures

There are so many antiallergic drugs now on the market that it is impossible to discuss their advantages or disadvantages here. Only those are mentioned which through personal use I have found to be comparatively effective.

Epinephrine is still the agent most dramatically effective in the prompt relief of an attack, and its prolonged use in proper physiologic doses does not have complicating effects. The more prompt its administration, the less likelihood of resulting emphysema—which is more harmful than the drug itself. In the later stages, epinephrine must be used with caution, as hypertension develops in about 40 per cent of these chronic asthmatic patients. An aerosol of 1:100 dilution of epinephrine may also be used. Various brands are on the market, and the advantage of one over the other seems to depend considerably upon the design of the aerosolizer. Isopropylarterenol hydrochloride (Isuprel®, Winthrop), 1:200, alone or combined with phenylephrine hydrochloride (Neo-Synephrine®, Winthrop), is very helpful in relieving bronchospasm and aiding expectoration. The latter is effective in epinephrine-fast patients. It is a potent bronchodilator (sympathomimetic amine) and is also useful after its inhalation has successfully controlled an acute attack. The sublingual tablet is effective in aborting further attacks and maintaining progressive improvement. The action may be further augmented by supplementation with oral tablets of a bronchial antispasmodic, such as a combination of theophylline, ephedrine and phenobarbital (Tedral®, Warner-Chilcott) in plain tablets, or in enteric-coated tablets for slow absorption during the night. Isuprel hydrochloride should not be administered along with epinephrine, as both drugs are direct cardiac stimulants; however, they may be used alternately.

Aminophylline, a diuretic, antispasmodic and cardiovascular agent, is also very effective in relieving asthma. It is a powerful bronchodilator which allows the tenacious mucus to be expelled easily upon coughing. Oral doses larger than 0.2 Gm. (3 grs.) three times a day may cause gastric irritation, and in acute conditions it is better given slowly intravenously in doses of 0.25 to 0.5 Gm. (4 to 7½ grs.). When hydration is necessary, aminophylline is injected intravenously, preferably in 500 ml. of a 5 per cent glucose solution or in one of the solutions used for restoration of fluid and electrolyte balance. Aminophylline is effective when administered in the form of rectal suppositories, each containing aminophylline 0.5 Gm. (7½ grs.), ephedrine hydrochloride 0.05 Gm. (¾ gr.) and Amytal® 0.1 Gm. (1½ grs.) in a suitable base. Whenever high therapeutic concentrations of oral aminophylline are required, a compound (Cardalin®; Irwin, Neisler) containing 0.325 Gm. (5 grs.) of aminophylline and the antinausea factors, aluminum hydroxide 0.15 Gm. (2½ grs.) and ethyl aminobenzoate 0.03 Gm. (½ gr.), may be given.

Oxtriphylline choline theophyllinate (Choledyl®, Nepera) is a true compound of theophylline, more soluble than aminophylline. It has a mild diuretic, vaso-

dilator and bronchodilator action and stimulates the myocardium. It is stable, better absorbed than aminophylline, and causes less gastric irritation. Brown and Clancy (5) in a recent study reported it to be very potent as well in nonallergic patients with infections. In oral dosage it has been found useful for the management of bronchial asthma (including pulmonary emphysema) and for the control of paroxysmal cardiac dyspnea. Like other xanthine compounds, it is effective as a mild diuretic in the management of dependent and chronic pulmonary edema secondary to congestive heart failure. The average initial oral dose is 0.2 Gm. (3 grs.), which can be gradually increased.

At night, for the prevention of mild attacks, enteric-coated tablets containing theophylline sodium acetate, ephedrine sulfate, and phenobarbital sodium (Luasmin®, Brewer) give the patient a considerable amount of comfort. In order to prolong their action, several of these antiallergic drugs are coated with substances of different absorption rates. When an antihistamine of slow action is indicated, chlorprophenpyridamine maleate (Chlor-Trimeton,® Schering) Repetabs, containing also sodium pentobarbital, maintain the effect safely for eight to ten hours. Both the plain and the coated tablets contain antinausea factors. For prolonged epinephrine effect, a 1:200 aqueous suspension of epinephrine in a base of 10 per cent glycerine, 2 per cent sodium thioglycolate and 0.5 per cent chlorobutanol (Sus-Phrine®, Brewer), may be given subcutaneously in an adult dose of 0.40 ml.

Hydration occurs particularly in patients who are taking cortisone, and there is also evidence of serum potassium depletion and an increased level of serum sodium. A low-salt diet is indicated during cortisone therapy, particularly when the steroid is given over a fairly long period. When possible, the concentration of serum sodium should be determined; if normal or slightly high, distilled water rather than physiologic saline should be used in the infusion. When there is also a low concentration of serum potassium, basic repair electrolyte solutions should be used (Butler's, Darrow's, or Baxter's). Aminophylline may be added to prevent further respiratory involvement.

Fresh "head colds" or acute sinusitis which may cause severe exacerbations of a chronic nasal allergy, infection or bronchial asthma, may be controlled or aborted by the use of compounds such as Biomydrin® (Nepera) (6) or Biomydrin F (addition of 0.2 per cent hydrocortisone alcohol), consisting of a combination of the antibiotics neomycin and gramicidin, supported by the antibacterial drug thonzonium bromine, the antihistamine thonzylamine (Neohetramine®, Nepera) and the vasoconstrictor phenylephrine hydrochloride (Neo-Synephrine®). The antibiotics in the solution are stable, possess a wide spectrum of activity throughout a broad range of pH, and are not affected by body fluids. Clinical use has shown that they do not lead to acquired sensitization or the induction of bacterial resistance after local application. The combination with hydrocortisone is particularly effective in chronic nasal infections.

Rectal anesthesia, in association with measures to support hydration, is quite effective for relieving acute bronchospasm or status asthmaticus. A retention enema of 2 to 3 drams of paraldehyde in 1 ounce of warm water, introduced high

into the rectum by means of a male catheter attached to a closed syringe, provides satisfactory and safe sedation and does not cause irritation such as that induced by ether in olive oil.

A detergent aerosol (such as Alevaire®, Winthrop) may be used for increasing humidification and for lowering the surface tension of the accumulated viscid sputum, which may have been present for a long time. However, if administered when not indicated, some bronchial irritation may result. Proteolytic enzyme aerosols (such as Tryptar®, Armour's crystalline trypsin or pancreatic desoxyribonuclease (dornase)) have had favorable effects but may cause pharyngitis and glossitis if administered longer than five days (7). Use of an X-sufflator with negative pressure, by increasing the minute volume in the lungs, combats respiratory acidosis; this is true also of steroid and bronchodilator therapy.

Administration of the corticosteroids, prednisone and prednisolone (Meticorten® and Meticortelone®, Schering), may be life-saving in the presence of intractable asthma. Since their introduction, the use of prednisolone has almost become a routine therapeutic procedure; even in very old patients, there is no increase in blood pressure and no other untoward effects. In fact, the comfort which results from their judicious use has a tendency to lower blood pressure in patients who have hypertension. Since a large majority of these chronic asthmatic patients with chronic infection have arthritis to a greater or lesser degree, the pronounced antirheumatic and anti-inflammatory activity of these steroids brings added relief. When the asthmatic symptoms have subsided following the administration of prednisone or prednisolone but the arthritic symptoms predominate, oral tablets (Sigmagen,® Schering) containing a corticoid-analgesic compound of prednisone 0.75 mg. ($\frac{1}{64}$ gr.), acetylsalicylic acid 325 mg. (5 grs.), ascorbic acid 20 mg. ($\frac{1}{3}$ gr.) and aluminum hydroxide 75 mg. ($1\frac{1}{4}$ grs.), taken in doses of one to two tablets every four to six hours provide remarkable relief. Use of this combination does not raise the blood pressure; in fact, long continued trial shows that it has a tendency to lower the blood pressure.

When there is concomitant chronic respiratory infection, therapy with prednisone and prednisolone may be supplemented by judiciously selected antibiotics given at intervals. When there is evidence of sodium retention after the use of steroids, corticotropin (ACTH) should be injected intramuscularly, preferably in the form of the slowly absorbed zinc suspension (such as Corticotrophin-Z®, Organon). In severe cases of chronic asthma, oral cortisone may be administered in a divided dosage of 200–400 mg. per day for the first two days, decreased to 50–100 mg. daily over a period of months. Cortisone is also useful in nonatopic bronchial asthma, lessening the severity to a greater degree than the formerly conventionally used medications. Continued use of steroids demands certain precautions, particularly with regard to low sodium intake.

Indiscriminate use of oxygen may reverse pulmonary ventilation, due to carbon dioxide narcosis. For relieving hypoxia during an acute exacerbation of obstructive dyspnea, oxygen should be administered with a double bent nasal catheter. The oxygen flow is gradually raised by a liter per minute each day until a level of 6 liters per minute is reached. The sudden administration of high con-

centrations of oxygen may cause hypoventilation, with retention of carbon dioxide and respiratory acidosis; the patient may become unconscious and die. In withdrawing oxygen, there should be a gradual reduction over a period of five to seven days.

Many physicians prefer the use of the B-L-B mask when administering oxygen or a mixture of helium and oxygen. The mask is easily applied and removed. Helium, being about five times more active than oxygen, flows with ease through constricted bronchial passages. Tanks are available which contain gaseous mixtures consisting of 80 per cent helium and 20 per cent oxygen. Such a mixture may be given directly or combined with an equal part of oxygen. One should adjust the gas flow so that the rebreathing bag of the B-L-B mask is not completely emptied at the end of each inspiration. Gas inhalation does not relax the bronchospasm, but makes breathing much easier.

Postoperative atelectasis occurring in the asthmatic patient may be treated advantageously by using a mixture of 5 per cent carbon dioxide in 95 per cent oxygen as a respiratory stimulant.

Much has been written about positive pressure breathing and the advantage of this or that gas machine in the treatment of the dreaded disease triad of chronic pulmonary infection, fibrosis and emphysema. Recently Leslie *et al.* (8), believing that the basic objectives of treatment of this type of pulmonary disease are the control and prevention of infection and bronchospasm, made a thorough investigation of the application of the newer therapeutic methods involving bronchodilator agents, expectorants, postural drainage, and so-called breathing exercises, which are often supplemented by abdominal binders and pneumoperitoneum. Thirty-three patients with pulmonary emphysema and various degrees of bronchospasm, fibrosis, bronchiectasis and chronic infection were treated with bronchodilator drugs, with and without intermittent positive pressure breathing. They used three bronchodilators which were power-nebulized for inhalation (the most effective method of administration) and given in random sequence, in order to determine which was the most satisfactory for each patient. The apparatus used for positive pressure breathing was set for a pressure of 15–20 cm. H_2O. In the first phase of the study, each drug was used four times for each patient—twice with, and twice without pressure breathing. Vital capacity estimations were made. Surprisingly, the improvement noted when the bronchodilators were used alone was not significantly enhanced by the pressure breathing. In the second phase of the study, the patients were treated over a longer period of time, with and without pressure breathing. In this phase also, the effectiveness of the bronchodilators and power nebulization was not augmented by intermittent positive pressure breathing. The authors' observations were previously confirmed by Fowler, Helmholz and Miller (9), who showed that intermittent positive pressure breathing did not increase the value of bronchodilator therapy. Leslie *et al.* call attention, however, to the fact that the use of intermittent positive pressure breathing has well established value in resuscitation, artificial respiration and pulmonary edema.

In many asthmatic patients, although the attacks may become less severe with

aging, annoying symptoms persist. In others there may be symptoms associated with organic disease. The sufferer may be made more comfortable if the management of all factors, including allergy, is coordinated with the development of complications. Some of these complications develop insidiously, and thus a serious new element in the disease may not be manifested by additional symptoms, but may be a major factor in bringing about a terminal condition.

COMPLICATIONS

Bronchostenosis

Bronchostenosis is a common and serious complication of asthma. It is the result of a localized pulmonary inflammation frequently occurring in a tertiary bronchus of a lower lobe and followed by edema and cicatricial narrowing of the bronchial passage. Such a condition usually causes severe persistent coughing in the patient's attempt to dislodge trapped mucus. Suppression sounds are heard over the involved area, and blood-tinged sputum is common. The trapped sputum may become purulent, accompanied by chills and fever. These symptoms subside upon expectoration of copious amounts of the purulent sputum. Selected antibiotics are indicated, administered either by the oral, inhalation, or parenteral route. When the asthma is under control, a bronchoscopic examination should be made, and the stenotic bronchus dilated. The resultant evacuation brings much relief.

Bronchiectasis

Goodale (10) and others have reported that 70 to 90 per cent of their patients with bronchiectasis had some dgree of sinusitis. Watson and Kibler (11) of Tucson, Arizona, found convincing evidence of allergy in the majority of their patients with bronchiectasis, most of whom had moved to Arizona from elsewhere. The sequence of pathologic changes in the development of bronchiectasis may be explained on the basis of an initial basic allergic bronchitis which eventually leads to an atelectasis; this, in turn, is followed after a variable period by bronchiectatic dilatation. Symptoms become more manifest when the dependent bronchi are involved.

Lack of excretory functions in the dependent bronchi result in a reservoir in which secretions collect and concentrate; they become viscid and are extremely difficult to expel until bacilli liquefy the medium. The infected tubes act as incubators, representing a dangerous focus of infection. The only cure of septic bronchiectasis is excision. When this is contraindicated, postural drainage, abstaining from irritants, and intelligent use of antibiotics may alleviate the condition.

Cardiac complications

In advanced emphysema, cardiac complications of asthma develop and chronic cor pulmonale (hypertrophy and dilatation of the right ventricle) may occur. The most common causes of primary chronic cor pulmonale are emphysema,

asthma and bronchiectasis, which frequently appear as complications. Any chronic infection which may cause pulmonary fibrosis is a factor. There is usually a history of long-standing chronic cough, and some patients have a special type of substernal pain brought about by exertion and relieved by rest, or induced whenever there is an increase in the underlying pulmonary condition. The signs of emphysema and cardiac failure may be similar, in that there is a large amount of dependent edema due to increased capillary pressure and anoxemia. At autopsy, there may be no demonstrable cardiac lesions. However, pulmonary arteritis was observed at autopsy in 75 per cent of patients with chronic pulmonary emphysema. Dyspnea on exertion, reduced vital capacity, cyanosis, increased venous pressure, a liver displaced downward by a low diaphragm, basal rales due to bronchitis, and distant heart sounds may occur in both emphysema and cardiac insufficiency. Shortness of breath, cough, and pulmonary signs of bronchospasm resulting from true allergic bronchial asthma are not relieved by an injection of a diuretic (such as Mercuhydrin®, Lakeside), whereas cardiac asthma responds well. This serves as a useful guide in differentiating between cardiac and bronchial asthma. Acetazoleamide (Diamox®, Lederle), a carbonic anhydrase inhibitor administered both orally and parenterally, has been of value in some cases as a diuretic, but there have been recent authentic reports of sensitivity to it. Another diuretic, Neohydrin® (Lakeside), has an advantage over Mercuhydrin in that it effectively and safely controls edema by the oral route. Aminophylline is the drug of choice for treating cor pulmonale. It is a safe, reliable bronchodilator, has a direct action on the heart, increases the cardiac output, lowers peripheral resistance (which is more marked in the pulmonary than in the systemic circulation), and diminishes pressure in the right auricle. Aminophylline acts directly upon the kidney, increasing renal plasma flow and the glomerular filtration rate. When combined with a mercurial diuretic, there is inhibition of tubular resorption of sodium and improvement of diuresis. Lack of response to aminophylline indicates an unfavorable prognosis. An aminophylline solution given rectally at intervals of six, eight, or twelve hours maintains a continuous beneficial effect. If aminophylline cannot be administered rectally, satisfactory results can be obtained with oral tablets (such as Cardalin), which permit a higher dosage of aminophylline (5 grs.) by combination with two protective factors.

One should not hesitate to administer digitalis in the treatment of right ventricular failure. Here also, the choice of the preparation is very important. Favorable results have been obtained with digitoxin, which should be administered until there is full digitalization, followed by a daily maintenance dose. The average digitalization dose with digitoxin is 1.2 mg., followed by a daily maintenance dose of 0.15 mg. The range of dosage may vary from less than 1.0 mg. up to 3.0 mg. for daily maintenance and for complete digitalization. As a rule, 0.6 mg. of digitoxin may be given by mouth, and 0.2 mg. every six hours until there is beginning compensation, or toxicity is noted. The dosage is then reduced to a maintenance level of 0.2 mg. daily. It is the custom of some physicians to digitalize with digitoxin for rapid effect, and then maintain the patient

with a whole-leaf digitalis preparation in an average daily dosage of 0.1 Gm. Digitalis therapy should be accompanied by salt restriction and the oral use of ammonium chloride and mercurial diuretics. If these procedures prove to be inadequate, cation exchange resins with supplemental potassium therapy may be helpful.

If the foregoing measures fail to relieve the hypoxia, and the hematocrit values approach 50 per cent, phlebotomy (withdrawing not more than 350 cc. of blood at one time and repeated at intervals of a week or more) may be used to reduce pulmonary arterial hypertension. Pulmonary vasodilatation has been reported as effective following the administration of tetra-ethyl ammonium chloride and tolazoline hydrochloride (Priscoline®, Ciba). Light sedation by the use of phenobarbital in oral doses of 30 to 60 mg. (½ to 1 gr.) may aid in relaxing the patient. Chloral hydrate combined with sodium bromide, given rectally in doses of 1 to 3 grams each (15¼ to 46 grs.) and repeated at twelve-hour intervals for several days, will not cause any serious respiratory depression. Paraldehyde is also an excellent sedative in these cases.

Nutritional factors are very important in the aging allergic patient. A high-protein diet is indicated, supplemented by a geriatric vitamin-mineral-protein preparation such as Gevral® Protein (Lederle), which contains 60 per cent protein and provides twenty-six vitamins and minerals in powder form to be dissolved in liquids. For combating anemia, an easily tolerated iron preparation may be used, which is free from irritative properties (*e.g.*, Fergon,® Winthrop). For the dry, itchy skins of dehydrated patients, an anticholinergic drug (Prantal®, Schering), or Prantal with cortisone, has proved to be effective in relieving this distressing condition.

Psychogenic factors

The aging allergic patient, particularly with above-average intelligence, is likely to become irritable, aggressive, quickly responsive, apprehensive, insecure, and lacking in self confidence. Such patients are self-absorbed and in a state of dreaminess, in addition to having an ambitious personality. Psychogenic factors, when present, must be given special attention in conjunction with other therapy. Allergists should be capable of giving advice and treatment along psychic lines. It is usually not necessary to send these patients for special psychogenic analysis, and they are referable to the psychiatrist only in the isolated and severe cases. The conscientious, sympathetic physician with a reassuring attitude is quite capable of managing them. Through careful questioning he can soon determine whether the allergic symptoms are due solely to psychogenic components (which rarely is the case) or whether psychogenic factors act as a "trigger" mechanism or are the secondary result of a chronic, often crippling, disease. When the aging, allergic, incapacitated patient commences to realize that his condition results in economic disability and social conflicts, particularly in normal domestic relationships, and that these conflicts aggravate the symptoms, the physician can frequently teach the patient to adjust himself. Old people frequently crave sympathy and, consciously or subconsciously, may employ their complaints to gain

their own ends. Alteration of the family relationship may produce definite beneficial results. Without embarrassing the patient, the physician should discuss freely all complaints, apparently unrelated sources of unhappiness, apprehension, and feelings of inadequacy and insecurity, in an effort to overcome psychologic maladjustments. A careful interview with other members of the family or close associates without the patient's knowledge is very helpful in making corrections. When possible, removal of the patient from an unpleasant environment may bring about an amazing improvement. Repeated reassurance to this type of patient in the older-age group, that his disease is not incurable, that he may lead a fairly satisfactory life and be happy in the future, is an invaluable feature of psychotherapy. This requires perseverance on the part of both the physician and the patient.

With the introduction of the newer so-called "equalizing" or "tranquilizing" drugs, the personality changes in these aging patients can be considerably improved. Oral tablets of methyl-phenidylacetate hydrochloride (Ritalin®, Ciba) restore the mood of the depressed patient to normal without fear of overstimulation. An elixir of reserpine (Serpasil®, Ciba) may be used for combined therapy of hypertension, emotional stress and strain, allergy, and many other conditions, and may be used in conjunction with other agents, such as the antihistamines. Tablets of reserpine (Reserpoid®, Upjohn) in various strengths, and a palatable elixir form containing 0.25 mg. per 5 cc., allow a wide range of dosage to meet the patient's requirements.

Chlorpromazine is used for the control of nausea, and for symptomatic control of severe agitation and acute anxiety. Meprobamate (Miltown®, Wallace Laboratories; or Equanil®, Wyeth), recently introduced, has been shown clinically to have very tranquilizing effects in 400-mg. doses; there are no autonomic side effects.

SUMMARY

Chronic progressive intractable bronchial asthma leading to pulmonary insufficiency and other serious complications accounts for the comparatively high death rate among asthmatic patients whose symptoms have persisted for more than ten years.

Respiratory conditions, mainly bronchitis, cause about 40 per cent of the infirmities of older people. Focal infections are important sources of bacterial sensitization which can cause and maintain a state of hypersensitiveness. Bronchospastic disease eventually develops, due either to chronic bronchial asthma or chronic pulmonary emphysema. Bronchial constriction starts a chain reaction of pulmonary insufficiency characterized by abnormal alveolar ventilatory function and progressive structural changes, eventually leading to serious pulmonocardiac complications.

Improved therapy of these malignant changes requires a thorough over-all understanding of their etiology and physiopathology, and the application of the more recent procedures required to retard their progress. These procedures consist of preventive measures, and the use bronchodilators, vasoconstrictors.

pulmono-ventilatory agents, and other carefully selected recent drugs developed through expert research. Among the latter are the newer antihistamines, antibiotics, and steroids, singly or in combination. All these measures lighten the burden of treatment, especially when combined with common-sense psychotherapy.

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SOME CLINICAL CONSEQUENCES OF CEREBRAL ANOXIA

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INTRODUCTION

Transitory mental confusion is almost a normal concomitant of any illness in old people (Bedford 1954). It is usually a nonspecific manifestation, without localising value, of a disease or disturbance quite remote from the brain. There are four main reasons for the brain in old age being so sensitive an "indicator" of disordered function anywhere in the body:

1. The human brain at any age is extremely vulnerable to anoxia (Courville, 1939; Hoff *et al.* 1945; Corday *et al.* 1953) because of its complete dependence on the aerobic production of energy from glucose (Himwich 1951). The relative immunity to anoxia of the brain of the newborn—which might be expected theoretically owing to the short-lived persistence of anaerobic glycolysis as a source of energy (Himwich 1951)—is not clinically apparent (Read, 1955).

2. The brain is probably more sensitive to lack of oxygen than any other organ or tissue in the body. Not all parts of the brain are equally sensitive however; consciousness is lost within forty-five seconds in complete oxygen-deprivation; the cortical neurones in the supragranular laminae cannot survive more than four minutes of anoxia; and ten minutes is probably the outside limit for survival of any of the nerve elements of the brain (Hoff *et al.* 1945).

3. The supply of oxygen to the brain is dependent upon the state of the heart, lungs, blood and blood vessels; the composition of the respiratory gases; and the integrity of such homœostatic mechanisms as the sino-aortic and spinal baroceptor reflexes (Heymans, 1950; Heymans and Delaunois, 1951; Heymans and Heuvel-Heymans, 1951). Cerebral cellular metabolism derives its energy from oxygen and glucose but also depends upon a supply of electrolytes, correct in amount and proportion. These electrolytes include sodium, potassium, calcium, hydrogen, and phosphorus, as well as other substances, including water, amino-acids, fats, glucose, enzymes and co-enzymes. These in turn are dependent upon the state of the liver and kidneys, the endocrine glands (for such substances as insulin and thyroid hormone), the intestines and the composition of the diet.

4. The cerebral circulation tends to become impaired in old age (Himwich 1951) and derangement of function of other organs occurs more readily because of their lowered "reserve."

It is, therefore, not surprising that the brain in old age is a sensitive indicator of disordered function anywhere in the body, and that geriatric practice provides a fruitful field for a study of the clinical effects of cerebral anoxia. The foregoing reasons also explain why the effects of cerebral anoxia are usually nonspecific, in

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the sense that the same clinical pattern may be produced by widely different aetiological factors.

PHYSIOLOGICAL CONSIDERATIONS

Cerebral anoxia is defined as a condition of oxygen lack in the brain from any cause.

The classification of anoxia into the following four types is still generally recognized but is far from satisfactory:

1. Anoxic—when the oxygen tension in the blood is lower than normal.
2. Anaemic—when the amount of functioning haemoglobin is reduced but the arterial oxygen tension is normal.
3. Stagnant—in which the blood supply to the tissues is insufficient but the arterial oxygen tension is normal.
4. Histotoxic—when the cells are unable to utilize effectively the oxygen supplied to them.

(This taxonomy takes no account of such essentially anoxic conditions as hypoglycaemia and disturbances in the potassium-sodium-calcium ratio; these, however, are best included in the "histotoxic" group.)

Certain types of anoxia are potentially more dangerous than others, the deciding factor being the availability of oxygen to, and within the cells. For example, in anoxic anoxia due to the respired atmosphere being poor in oxygen, the lowered oxygen tension in the blood stimulates breathing and results in carbon dioxide being "washed out" of the blood. Thus, not only is there too little oxygen in the blood, but the oxygen which is present is less readily available to the tissues because the concomitant reduction in CO_2 tension impedes the dissociation of oxyhaemoglobin (the curve is "shifted to the left"). In these circumstances, any increased demand by the cells for oxygen may further aggravate the anoxia.

Again, the anaemic anoxia of carbon monoxide poisoning is much more serious than a haemorrhagic or Addisonian anaemia in which the amount of functioning haemoglobin is reduced to the same degree; for carboxyhaemoglobin impairs the dissociation of oxyhaemoglobin and so the oxygen which *is* present is less readily available to the cells. Similarly the histotoxic anoxia due, for example, to narcotic drugs or cyanide is potentially very serious, for the cells are rendered unable to utilize the oxygen supplied to them. There is a parallel between this type of anoxia and the effect on the brain of hypoglycaemia, in which the cells are unable to utilize oxygen by being deprived of the energy mechanism for doing so.

There are numerous conditions which may produce cerebral anoxia (Bedford 1955, 1956), including "cerebral circulatory failure" from any cause (Corday *et al.* 1953) and general and cerebral metabolic disturbances (Allison 1952). In clinical practice, it is often not possible to determine with accuracy the immediate cause of damage, for multiple factors and more than one type of anoxia frequently co-exist in the same patient. Examples of some factors which should be constantly borne in mind are as follows:

1. The routine (and therefore indiscriminate) prescription of such drugs as

morphine, atropine, hyoscine and barbiturates as preoperative and postoperative medication for patients young and old, and without knowledge of the individual's sensitivity to them.

2. Pyrexia and toxic-infective states (*e.g.*, cystopyelonephritis following prostatectomy) render the brain more susceptible to anoxia by increasing its basal oxygen consumption (Himwich 1951). This may well be a factor in the development of the dementia seen occasionally after prostatectomy (Bedford 1955).

3. The sino-aortic and spinal baroceptor reflexes which normally maintain cerebral blood flow may be abrogated during general and spinal anaesthesia and in the hypotension deliberately induced with methonium and allied compounds to facilitate the surgeon's task. The blood supply to the brain may thereby be imperilled and the risk of cerebral anoxia enhanced by such otherwise innocuous manoeuvres as movement of the patient or alteration in his posture.

CLINICAL CONSEQUENCES OF CEREBRAL ANOXIA

It is proposed to limit this discussion to some interesting clinical effects of cerebral anoxia which have perhaps received rather less attention than they merit. They fall into two broad groups, namely:

A. Transient, or apparently fully reversible effects.

B. Permanent cerebral incapacity of varying degree.

Although experimentally it may be possible to induce cerebral ischaemia independently of anoxia (Lucas, 1956)—each showing characteristic histological changes (Hoff *et al.* 1945)—it is very difficult to envisage cerebral ischaemia occurring clinically without cerebral anoxia. It will therefore be assumed throughout this communication that the effects of cerebral ischaemia and anoxia are essentially the same and a clinical separation will not be attempted.

A. Transient or apparently fully reversible states

(This reservation is necessary in the absence of detailed psychometric testing before and after the incident. Such a project is quite feasible but necessitates psychometry on a very large scale; these facilities have not been available.)

In most of these states the patient is aware, on recovery of full consciousness, that he has been mentally confused—and often in what way. Some of them appear to be of the nature of unduly prolonged, exaggerated and vivid dream-states.

1. Sleep-disturbances

These take the form of disturbed and restless sleep, nightmares, unduly and unusually vivid dreams, and occasionally somnambulism, in patients who have previously not been so disturbed. They occur in patients with heart failure, emphysema and lung failure, and in toxic and febrile conditions.

Case 1. H. L., a man aged 72, had for three weeks suffered from terrifying dreams; he would awaken in the night, panic-stricken, screaming and breathless. His dreams were of differing content, but were always vivid, well-remembered and terrifying. He had never

previously been similarly afflicted. He complained of dyspnoea on effort for the same period but had no cardiac pain. He was suffering from left ventricular failure due to a cardiac infarction. He made a good recovery. A precisely similar series of symptoms occurred sixteen months later. He died suddenly of a coronary thrombosis nearly two years after the first episode. Necropsy showed no notable cerebral abnormality.

2. Hypnagogic confusion

This occurs quite commonly in healthy people at any age but rarely lasts more than a few minutes. In old people, however, a state of disordered consciousness with loss of contact with reality and mental confusion may last for as long as two hours after half-awakening from sleep and may cause alarm and worry to the patient and to his relatives. This state occurs in toxic and febrile conditions, in old people suffering from the effects of cerebral arteriosclerosis and particularly following sleep induced with barbiturates and other potent hypnotic drugs. It probably reflects an undue depression of the respiratory centre during sleep.

The confusion has sometimes been aborted by lobeline or nikethamide given intravenously, when "control" injections of "normal saline" and inhalation of oxygen have failed.

3. Iatrogenic confusional states

Although such conditions can be permanent and occasionally catastrophic, they are very rarely so (these will be discussed later). A transient state of mental confusion induced by drugs is extremely common, however. It is often unrecognized and is frequently treated with the very drugs which induce it!

Case 2. H. B., a man aged 68, was given morphine to alleviate low back pain believed to be due to a vertebral metastasis from prostatic carcinoma. He became a little strange in his manner but still complained of pain and was therefore given more morphine. His mentality rapidly deteriorated; he became aggressive, noisy, difficult to control and doubly incontinent. Over the next twelve hours, morphine, hyoscine and repeated doses of a mixture of chloral hydrate, potassium bromide and opium produced no improvement! He did not recover his normal mental state until twenty-four hours after admission to hospital. He died of uraemia seven weeks later. Necropsy showed no notable cerebral abnormality.

Although the results of bromide intoxication are widely known, far too little attention is paid to the anoxic and histotoxic effects of potent narcotic and analgesic drugs. They readily induce mental confusion in old people and do much to exacerbate any co-existing mental impairment. They should be used with caution and discrimination in old people. When sedatives are specifically indicated, drugs such as paraldehyde, chloral or methyl pentynol should be tried first.

4. Nocturnal confusional states

In these states there is often delirium, increased motor activity, violent or disordered behaviour and sometimes hallucinosis. Characteristically the patient is mentally quite normal during the day and remembers his mental confusion of the previous night. The disordered behaviour can be so disturbing as to lead to the patient's committal to a mental hospital. When due to lowered cardiac output in heart failure (stagnant anoxia), it frequently responds dramatically to

aminophylline given intravenously, but very rarely to oxygen, for the arterial oxygen tension is normal. When due to the anoxic anoxia of lung disease, immediate treatment is disappointing, but oxygen and lobeline are occasionally helpful. This type of confusion is also seen in toxic, infective, and pyrexial conditions and in uraemia and pyelonephritis.

5. Periodic breathing

This is a physiological phenomenon during sleep in infancy and is sometimes observed in apparently healthy old people during deep natural sleep. It is seen not infrequently in patients with heart failure, uraemia and chronic anaemia, cerebral arteriopathic conditions, during sleep induced by narcotic drugs and in respiratory and cerebral disease. It is thought to be due to depression of the respiratory centre and is sometimes associated with lesions of the brainstem. It may be accompanied by fluctuating consciousness and vasomotor disturbances. It usually responds to aminophylline either intravenously or in suppositories. When due to anoxic anoxia, and if aminophylline fails, it may respond to oxygen and intravenous lobeline or nikethamide.

6. Some other reversible organic cerebral reactions

This miscellaneous group is characterized by an apparently completely reversible cerebral reaction, including such manifestations as mental confusion, and deterioration in personality, intellect and habits. This reaction is of longer duration than those previously described, but lasts little longer than the period during which the precipitating cause is operative.

Case 3. A. K., a married woman aged 78, suffered from idiopathic aplastic anaemia and had been kept alive for two and a half years by blood transfusions. Whenever her haemoglobin level fell below 50 per cent (Haldane) she became mentally confused, agitated, hallucinated, deluded, incontinent of urine and faeces, and difficult to manage. She was invariably restored to mental normality by blood transfusion.

Case 4. E. O., an unmarried woman aged 59, had for many years been crippled with rheumatoid arthritis. She was admitted to hospital with persecutory delusions, incontinent of urine and faeces, noisy, confused and difficult to manage. She was found to be thyrotoxic. Her mental state became completely normal after five weeks of treatment with antithyroid drugs. Two relapses were precipitated by withdrawing treatment and were relieved each time by reinstituting it. Her cerebral condition appeared to be directly related to the degree of thyrotoxicosis, as measured by the B.M.R. and radioactive iodine tracer tests. (This appears to be an example of cerebral anoxia as a result of excessive demand for oxygen by the cells.)

Similar cases occur due to anoxic anoxia in acute bronchitis, bronchopneumonia and other respiratory disorders; and due to both anoxia and histotoxic anoxia, not infrequently, in patients poisoned with hyoscine, barbiturates and other potent hypnotic and analgesic drugs. It is well known, too, that similar transitory confusional states often occur in elderly people following operations under general anaesthesia.

The rapidity with which the organic cerebral reaction due to "cerebral circulatory failure" precipitated by such conditions as acute left ventricular failure, and the hypotensive ("shock") states of coronary thrombosis, acute haemor-

rhage and pneumonia, can sometimes be reversed is often remarkable. Full mental equilibrium has been restored on occasions with the needle still in situ during the course of an intravenous injection of aminophylline, a blood transfusion or an infusion of nor-adrenaline. (The rare occurrence of permanent cerebral impairment associated with these same conditions is discussed later.)

7. "Organic neurasthenia"

This is a much misused diagnosis which has consequently fallen into disrepute. As defined by Lewis (1947), however, it remains a useful title for a syndrome, the chief features of which are irritability, languor, fatigue, emotional hypersensitiveness, irascibility, mood disorders, headache, impairment of memory and difficulty in concentration. It occurs as a result of many physical causes, including such anoxic episodes as acute haemorrhage, operations under general anaesthesia, asphyxia during dental and out-patient nitrous-oxide administration, anoxic pulmonary heart failure, and overdosage with morphine, hyoscine and barbiturates. Recovery tends to be slow but complete after the precipitating factor has ceased to operate (Lewis 1947), but the condition may occasionally be permanent, as will be discussed later.

8. Transient focal neurological signs

Such transient signs (*e.g.*, a rapidly recovering hemiplegia) have been observed in association with conditions causing "cerebral circulatory failure" and are due presumably to "stagnant" anoxia, since necropsy has failed to reveal focal cerebral damage. The association of such rapidly reversible cerebral states with the shock of cardiac infarction is well attested (Bean and Read 1942; Cole and Sugarman 1952, Lancet annotation 1952). These focal signs are difficult to explain. Possibly there is a coincidental minor cerebral vascular abnormality which escapes detection; the turbulence effect of such an abnormality could well give rise to a drop in pressure between the main and subsidiary streams. There are many possible explanations but none which have been proved or which are entirely satisfying.

B. Permanent cerebral incapacity

The principal groups to be discussed here are the major and minor dementias. In a previous paper (Bedford 1955) I reported 18 cases of extreme dementia occurring in previously mentally normal old people following operations under general anaesthesia; in 91 patients lesser degrees of intellectual impairment developed. Major and minor degrees of cerebral incapacity following anoxic episodes, however, are by no means limited to old people, nor to operations under general anaesthesia.

1. "Organic neurasthenia"

Although full recovery is the rule, this syndrome is occasionally irreversible. The clinical picture merges imperceptibly with that of the lesser degrees of dementia which form the next group, I have no doubt that intellectual deteriora-

tion is common to both groups, but in the absence of detailed psychometric testing before and after the event, I have separated them in this communication.

Case 5. H. B. S., a man aged 63, was a retired company director. Four years previously he had bronchopneumonia and was gravely ill for three weeks, two of which were spent in an oxygen tent, his life despaired of. He made a full physical recovery but since then had been irritable and easily fatigued; he was given to outbursts of irrational anger and wept uncontrollably at even trivial upsets. He had retired three years previously because of his inability to concentrate and had shown no improvement despite faithful adherence to medical advice.

2. Minor dementias

These comprise minor degrees of impairment of memory, intellect and performance, deterioration in the personality and habits, and lessened emotional control. This clinical picture has been observed following operations under general anaesthesia, dental and out-patient administration of "gas," severe acute haemorrhage, pneumonia, and overdosage with barbiturates, hyoscine and morphine.

Case 6. Mrs. R. W. N., aged 33, was a vivacious woman, a good conversationalist, and a competition bridge-player. Besides being a competent housewife and the mother of 2 children, she used to act as secretary to her husband—a busy dental surgeon. Five years previously a fingernail was avulsed in the out-patient theatre under general anaesthesia (thiopentone followed by nitrous oxide and oxygen). Recovery was delayed and she was detained in hospital for thirty-six hours. Since then she had been dull and had lost her vivacity. She was forgetful and could not play bridge. She was faulty at adding up simple sums of money when shopping and was unable to help her husband with his work. She herself said, "I don't know what's wrong, but it seems that my mind is foggy—like the 'before taking' picture in Horlick's advertisements."

These minor dementias, like the "organic neurasthenias" cause great distress, not only to the patient, but also to his relatives and friends, the tenor of whose complaints is remarkably uniform:

"He's just not the same person since. . . ."

"He's never read a book through since. . . ."

"She's lost all interest in the family since. . . ."

"He's never been able to write a decent letter since. . . ."

In those of higher intellectual status these minor dementias are even more distressful, and they may be incapacitating to one whose interests and work demand protracted mental effort and concentration; thus the difficulty experienced by a history don in concentrating over a book, and the impairment of memory sustained by a practising surgeon after undergoing prostatectomy, proved so disabling that neither was able to continue his vocation.

The situation is not improved by the misdiagnosis of such cases as "hysteria" and "neurosis" in the young (as was Case 6; and *vide* Cartwright 1955), and as "senility" in the old.

3. Extreme dementia

This comprises a state in which the deterioration in intellect is so gross that the individual is virtually a human vegetable—unable to help himself, wet and dirty,

and mentally inaccessible. Recognizable syndromes within this group include the "decorticate" and "decerebrate" states, similar to those following severe head injury. Between these and the minor dementias there are cases which show intermediate degrees of severity; rarely the Korsakoff syndrome is seen. The clinical patterns are, however, nonspecific in the sense that the same picture can be induced by any of the many causes of cerebral anoxia.

Only a very simple classification will be made here by separating the complex group of cases labelled "operation under general anaesthesia" from those in which a single factor appears to be chiefly operative. Only 1 case-history will be given in detail, for they were all essentially the same, in that the patients were mentally normal before the episode but abjectly demented following it.

(i) *Extreme dementia following operation under general anesthesia.* Of 29 such patients, 18 were operated on while under my personal supervision so that I was able to compare their mental states before and after operation (Bedford 1955).

Case 7. M. S., a woman aged 82, was an intelligent, kindly person—a voracious reader and fond of an argument. She did excellent needlework and was a friendly and helpful neighbour.

While walking in the street she tripped over the kerb and fractured the neck of her right femur. On admission to hospital she gave an excellent account of herself. Her hip was pinned under general anaesthesia.

On recovery she was noisy, confused, irrational, incontinent of urine and faeces and mentally inaccessible. She was given sedatives and analgesic drugs with no improvement, but thereafter she slept for long periods. There were no postoperative chest complications; her blood urea level, electrocardiogram, and blood pressure were normal; there were no abnormal neurological signs. She remained in a state of extreme dementia until her death, three months later, from bronchopneumonia and bedsores. She was doubly incontinent, unaware of her surroundings, and unable to recognize her former intimates.

(ii) *Cerebral circulatory failure* (Corday *et al.* 1953).

(a) Haemorrhage: Five cases of gross dementia following massive acute haemorrhage from the intestinal or genito-urinary tract have been recorded (Bedford, in press).

(b) Hypotensive "shock" states:

i) cardiac infarction (4 cases) and

ii) pneumonia (4 cases); these two disorders have precipitated extreme dementia (Bedford: in preparation).

iii) severe diarrhoea.

Case 8. S. P., a man aged 80, suffered permanent extreme dementia following severe hypotension (B.P. 60/?) lasting for two hours and due to diarrhoea caused by acute salmonella dysentery.

(c) Cardiac arrest:

i) during surgical operations on patients young and old, and

ii) in a Stokes-Adams attack.

Case 9. E. E., a woman aged 78, had for six months suffered infrequent Stokes-Adams attacks due to complete heart block. A period of cardiac asystole lasting six minutes was observed and recorded electrocardiographically. She subsequently recovered consciousness and survived for seventy-two hours in a "decorticate" state.

4. *Localized cerebral damage*

Transient focal neurological signs associated with the shock of cardiac infarction have already been mentioned. Permanent focal cerebral damage is a well known occasional sequel to anoxic episodes, *e.g.*, Parkinsonism following carbon monoxide poisoning.

An interesting association which appears to have received little attention in the medical literature is the occurrence of focal cerebral infarcts in cases of anoxic pulmonary heart disease (cor pulmonale). Four such cases have been observed personally (Bedford and Wollner, in preparation), not all of which fall within the geriatric age-groups.

Case 10. G. C., a man aged 42, had epileptiform convulsions on two occasions during the eighteen months he survived following the diagnosis of congestive heart failure due to chronic bronchitis with emphysema. Executive dysphasia was followed fifteen months later by left hemiparesis, and both persisted until he died. There had been sinus cardiac rhythm throughout his illness, and his cerebral vessels were normal at necropsy, yet he had one large infarct in the right hemisphere and several smaller ones in both hemispheres.

DISCUSSION

Although most of the examples cited here are drawn from geriatric practice, it must not be assumed that cerebral anoxia is withstood with impunity by younger people. The apparent relative immunity of the young is probably due to their greater "mental reserve" (the cerebral circulatory impairment of senescence has not yet developed) and hence to the greater rapidity with which they compensate for any damage they suffer.

Individual idiosyncrasy. A most interesting and puzzling question which emerges from a study of the clinical effects of cerebral anoxia is why these effects occur so infrequently. Many patients are exposed to serious degrees of anoxia, yet dementia following these episodes is comparatively rare. It must be admitted that no satisfactory explanation of this anomaly is forthcoming. It appears necessary to postulate an individual idiosyncrasy—a personal susceptibility or "allergy"—to anoxia (or ischaemia) in those who suffer brain damage. Whether this idiosyncrasy is a function 1) of the brain itself, 2) of over-irritability of the baroceptor reflex mechanisms, 3) of undue cerebral vasoconstriction (a concept in conflict with the views of Pickering, 1955, but supported by the work of Byrom, 1954), or 4) of something still not defined, is entirely unknown, and no clue to its satisfactory solution is yet apparent.

Extreme dementia is such a catastrophe that every possible factor should be considered in taking precautionary measures against its development and in treating it should it occur. Asphyxia masquerading as anaesthesia; "hypotensive surgery"; and the routine (and hence indiscriminate) use of potent hypnotic and analgesic drugs preoperatively, postoperatively, and in the management of elderly confused patients, are all unjustified. Acute blood loss in the elderly demands even more urgent correction than in the young: arrest at the source is axiomatic if feasible. The role of surgery, preferably under local anaesthesia, in the prophylaxis and treatment of bleeding peptic ulcer should be given due weight and not rejected on the grounds of age alone.

Finally, should the catastrophe occur despite precautionary measures, urgent consideration should be given to limiting the extent of the damage by treatment aimed towards minimizing the oedema and capillary destruction associated with cerebral anoxia, and towards maintaining the nutrition of the brain. Measures for dehydration, hypothermia, and administration of cortisone or corticotropin, glutamic or succinic acids, glucose, thiamine, insulin and oxygen should be borne in mind, although so far nothing has proved effective.

SUMMARY

The reasons for the vulnerability of the aged brain to anoxia are indicated and some physiological principles restated.

Both transitory and irreversible clinical effects are discussed, and some clinical examples are cited; these include cases of all grades of severity, from transient confusional states to extreme dementia. Although severe anoxia is common, serious cerebral complications are rare. Reasons for this anomaly are discussed, and a factor of personal idiosyncrasy is proposed. Some precautionary and therapeutic measures are suggested.

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USE OF *d*-AMPHETAMINE TO CURB THE INCREASED APPETITE AND OVER-EATING INDUCED BY RESERPINE THERAPY*

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It is ironic that reserpine, which is widely used as an antihypertensive agent, also stimulates the appetite. In a series of 47 hypertensive patients whom we treated with reserpine, nearly two-thirds reported an increase in appetite; about half of them gained 5 pounds or more (1). In many cases, *e.g.*, psychoneurotic or hypertensive subjects who are already overweight, prescribing the drug may further stimulate the appetite. Advising these patients to restrict their food intake and expecting them to follow the advice usually amounts to little more than wishful thinking. Although they may start zealously to adhere to a low-calorie diet, before long their good intentions are forgotten.

For those who will not adhere faithfully to a low-calorie diet, some type of supportive measure is needed. Since much has been written about anorexigenic agents as an aid in treating obesity, we undertook this study in order to determine whether one of these agents, *d*-amphetamine, would offset the orexigenic effect of reserpine.

MATERIAL AND METHODS

There were 31 patients in the group—5 men and 26 women, all of whom were overweight for their particular height and body build. They were seen in the out-patient clinic of Jefferson Davis Hospital and in private practice. Sixteen were white; 15 Negro. Their ages ranged from 31 to 79 years, with an average of 51 years. Body weights ranged from 137 to 350 pounds, and averaged 204 pounds. Table 1, which lists the patients' diagnoses, shows that the complications of obesity were often present. For example, almost half the group had hypertensive cardiovascular disease.

Prior to the study, each patient was interviewed for medical history, and given a physical examination and appropriate laboratory tests. Since most had been followed for several years, data on metabolic and endocrine functions were available.

The initial daily dosage of reserpine was 0.25 mg. orally three times daily. The patients were also given one tablet of a vitamin-mineral preparation (Amplus®)[1] containing 5 mg. of *d*-amphetamine, thirty minutes before each meal. Those who later complained of insomnia were allowed to discontinue the evening dose of *d*-amphetamine. No restrictions on food or water consumption were imposed or suggested. Patients were simply asked to take the medicaments and return for weekly check-ups, at which time, weight, temperature, blood

* Supported in part by research grants from the Houston Heart Association, the Humble Oil Company, and J. B. Roerig & Company.

[1] J. B. Roerig & Co., Chicago, Illinois.

TABLE 1

Summary of Clinical Diagnoses Prior to Drug Administration

Diagnosis	No. of Patients	Per Cent of Total
Obesity	31	100
Hypertensive cardiovascular disease	15	48
"Arthritis"	3	10
"Anxiety neurosis"	3	10
Diabetes mellitus	2	6
Arteriosclerotic heart disease	2	6
Epilepsy	1	3
Asthma	1	3
Rheumatic heart disease	1	3
Syphilis	1	3

TABLE 2

Changes in Weight and Blood Pressure from the Control Values during Combined Reserpine and d-Amphetamine Therapy

Week of Therapy	Mean Weight Loss (pounds)	P Value* Less Than	Change in Blood Pressure (mm. Hg)	
			Systolic	Diastolic
Fourth	−4.7	.001	−8	−8
Eighth	−7.1	.001	−13	−10
Twelfth	−10.9	.01	−22	−6
Sixteenth	−10.9	.001	−23	−7

* A value for P which is less than 0.05 is statistically significant; $t = \bar{x}\sqrt{\frac{N\,(N-1)}{Sx^2}}$.

(Statistical analysis by R. A. Seibert, Ph.D.)

pressure and pulse rate were recorded. Without asking leading questions, we then elicited the state of the patient's appetite and whether or not he had experienced side-effects.

RESULTS

Table 2 summarizes the average changes in weight and blood pressure observed over a course of sixteen weeks. After four weeks of reserpine and *d*-amphetamine therapy, the group showed an average weight loss of 4.7 pounds. They continued to lose weight until, at the end of twelve weeks, their cumulative weight loss was 10.9 pounds. No further loss occurred during the next four weeks. Both systolic and diastolic blood pressure fell gradually during the first eight weeks of therapy. Only the systolic pressure decreased during the next four weeks. After that, no further drop in blood pressure occurred. These blood pressure data include the changes in all of the patients—both those with normal blood pressure (control b.p. <150/100 mm. Hg) and those with elevated blood pressure (in this series, only mild hypertension; control diastolic b.p. <120 mm. Hg).

TABLE 3

Effect of d-Amphetamine on the Response to Reserpine

	Reserpine Alone		Reserpine + *d*-Amphetamine	
	No.	%	No.	%
No. of patients treated	47	100	31	100
Change in appetite				
Increase	28	60	1	3
Decrease	—	—	29	97
Change in weight*				
Increase	23	49	0	0
Decrease	—	—	19	61
Change in blood pressure†				
Systolic	−12 mm. Hg		−10 mm. Hg	
Diastolic	−11 mm. Hg		−9 mm. Hg	

* Change of 5 or more pounds.

† Includes only mild hypertensive patients (all with control diastolic blood pressures <120 mm. but >100 mm. Hg).

Table 3 shows the effect of reserpine on appetite and weight in a group of patients with mild hypertension (control diastolic b.p. <120, but >100 mm. Hg) studied previously, as compared to the effect of combined reserpine-amphetamine therapy in the present group. The findings demonstrate the usefulness of *d*-amphetamine for controlling the increased appetite stimulated by reserpine therapy—97 per cent of the patients receiving the combination experienced a decrease in appetite. In contrast, 60 per cent of the patients receiving reserpine alone experienced an increase in appetite. Furthermore, 61 per cent of those receiving the combination drug lost 5 pounds or more, whereas 49 per cent of those taking only reserpine gained 5 pounds or more. In no case did a patient being treated with both *d*-amphetamine and reserpine gain as much as 5 pounds. Table 3 also shows that combined reserpine and *d*-amphetamine therapy reduces blood pressure as well as does reserpine alone. The close parallel between the decreases in weight and in blood pressure in the individual patients is impressive. This parallelism is, however, not as evident when patients are considered as a group and the results are interpreted on the basis of the over-all average change in blood pressure.

The side-effects were mild and infrequent. Three patients complained of insomnia; in 2 of them the insomnia could be relieved by omitting the dose of *d*-amphetamine before the evening meal. One patient complained of nausea and 1 of palpitation; these effects were, however, transient.

DISCUSSION

Even a superficial look at the extensive literature on *d*-amphetamine, its pharmacology, and clinical uses shows that most investigators evaluating its usefulness in the treatment of obesity believe that a low-calorie diet is a necessary

part of the regimen (2, 3). In our study we allowed the patients a free choice of diet, in order to determine whether *d*-amphetamine would curb appetite under these circumstances. Our results, which parallel those of Gelvin and McGavack (4), show that the patients lost a satisfactory amount of weight (1 pound per week) over a period of twelve weeks; they then appeared to have developed a tolerance to the anorexigenic effect of the drug and lost no more, or very little weight. This does not mean that *d*-amphetamine is valueless in treating obesity. It simply points up the fact that the use of the drug is an ancillary and temporary measure to help the obese patient to establish a diet in balance with his caloric requirements or to resolve, by physician counseling, emotional conflicts that contribute to over-eating. Williams and associates (5) believe that anorexigenic agents are necessary only when a patient will not adhere to a prescribed, low-calorie diet.

A sampling of the literature on *d*-amphetamine, especially the early reports, shows that the drug was considered to be contraindicated in hypertension (6). In recent years, however, several investigators have reported that *d*-amphetamine has no significant long-range effect on blood pressure or pulse rate. Goodman and Housel (7), in a study of 148 patients with essential hypertension and obesity, found that although the drug induced an immediate but transient vasoconstriction, its overall effect on blood pressure was negligible. Moreover, Roberts (8) observed that *d*-amphetamine, by depressing appetite and elevating mood, enabled obese hypertensive persons to lose weight; this, in turn, resulted in a lowering of blood pressure. Our observations are in accord with those reported in the recent literature, namely that *d*-amphetamine is not contraindicated in hypertension, but actually may be beneficial when obesity is a contributing factor. However, these findings do not mean that the drug should be used across-the-board in obese hypertensive patients. As with any potent agent, *d*-amphetamine should be used with discrimination, starting with a small test dose and gradually increasing until a satisfactory clinical response occurs or intolerance supervenes. It should be used cautiously in patients who are hypersensitive to sympathomimetic compounds, in those with coronary or cardiovascular disease, and in those with severe hypertension.

Up to this point we have ignored the mood-elevating effect attributed to *d*-amphetamine. Eisfelder (9) considers the drug to be useful in treating obesity, not only because of its anorexigenic effect, but also because it relieves the depression which often accompanies a reducing regimen. Conjecturally, one might therefore expect *d*-amphetamine to relieve the mild depressed states (but not depressive reactions) often seen in patients taking reserpine. In our total experience, which is based on a much larger group of patients than that reported here, *d*-amphetamine does relieve the mild depression and lassitude which may be induced by administration of reserpine and other Rauwolfia preparations.

SUMMARY

Thirty-one obese patients who experienced increased appetite and weight gain during reserpine therapy were given *d*-amphetamine concomitantly, in

order to determine whether or not it would curb their over-eating and enable them to lose weight. Even though restrictions on food and water intake were not imposed, *d*-amphetamine counteracted the orexigenic effect of reserpine. Nearly all patients lost a pound a week over a course of twelve weeks. After this, however, the efficacy of *d*-amphetamine diminished. In the patients with mild hypertension *d*-amphetamine had no appreciable effect on the blood pressure changes induced by reserpine. In the patients with normal blood pressure, *d*-amphetamine induced either no change or a decrease in blood pressure associated with a decrease in weight. Moreover, it relieved the mild depression and lassitude commonly noted as a result of administration of reserpine. With the use of combined *d*-amphetamine-reserpine therapy, side-effects were infrequent and mild, consisting of insomnia, transient nausea and palpitation.

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EFFECTS OF METHYPRYLON (NOLUDAR) AND PHENOBARBITAL ON THE ELECTROCARDIOGRAM

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This investigation was undertaken to determine if any change in the electrocardiogram is caused by clinically effective doses of a newly developed sedative-hypnotic—methyprylon or 3,3-diethyl-5-methyl-2,4-piperidinedione (Noludar[1]) (1). For comparison, phenobarbital was also tested in the same manner.

METHODS

Thirty patients were studied. Their ages ranged from 54 to 84 years. All but 3 had definite evidence of cardiac disease, either on physical examination or in the electrocardiogram. The etiologic factor was either arteriosclerosis or hypertension. The cardiac condition was apparently stable in all; there was either good compensation or only mild decompensation. Ten patients were receiving insulin because of diabetes mellitus.

Each patient was given methyprylon (Noludar) in a dosage of 100 mg. four times a day for four days. This dosage is somewhat larger than that which is clinically effective as a sedative. To compare the effects with those induced by a standard sedative, each patient received a course of phenobarbital, 0.03 Gm. four times a day for four days. At least four days elapsed between courses. Electrocardiograms taken before and after each course were examined for changes in the form of the complexes, in the duration of the various phases (P–R interval, QRS duration and Q–T duration) and in the rhythm.

RESULTS

In no instance was there any electrocardiographic or clinical evidence that either drug in the dosages used had an effect on the heart. Ordinary soporific doses of barbiturates may depress the cardiac output, blood pressure and respiration (2, 3). However, the effect is usually too small to be clinically significant. Only when the patient is in a critical state and therefore unusually sensitive to a small decrease in the foregoing functions would there be a clinical effect (4). Under such conditions, the electrocardiogram may conceivably show changes because of anoxemia and impaired coronary flow. In the present series there were no critically ill patients who might have been sensitive to the mild effects of the drugs. In healthy individuals, barbiturates, even in suicidal doses, affect the electrocardiogram indirectly through a severe depression of the cardiac output, blood pressure and/or respiration (5).

Myocardial disease facilitates the appearance of electrocardiographic changes caused by drugs in general. For example, when the atrioventricular conduction

[1] Furnished to us by Hoffmann-La Roche, Inc., Nutley, New Jersey.

system is already ischemic because of coronary artery disease, it is more sensitive than a healthy conduction system to a drug which depresses conduction. The fact that most of the patients in this series had pathologic conditions of the heart enhances the significance of the absence of any noticeable effect of the drugs on the electrocardiographic tracings.

Three patients showed some changes in the tracings during the investigation. The sequence of the changes indicated that they reflected the occurrence of small areas of ischemic damage in hearts afflicted with coronary sclerosis. They were, in our opinion, not related to the administration of the drugs. Ordinarily these alterations would not be evident clinically, *i.e.*, there would be no change in the symptoms or physical signs which could be ascribed to the new pathologic findings. Only because frequent tracings were made did the small infarcts become manifest. Rodstein's recent report (6) is pertinent here. Over a period of five years, among 700 ambulatory residents of a home for the aged, he found 47 instances of myocardial infarction. Among these 47 were 14 cases showing only electrocardiographic changes unaccompanied by other clinical or laboratory signs. They are comparable to the cases cited here. In a postmortem series of hearts showing coronary sclerosis reported by Sayen, Sheldon and Wolferth (7), small acute and scarred ischemic lesions were common. They represented episodes of recurrent myocardial ischemia, many of which were clinically silent and presumably would be detected only with serial electrocardiographic tracings.

CONCLUSIONS

Thirty aged patients, of whom 27 had chronic cardiac disease, were given clinical doses of methyprylon (Noludar) and phenobarbital. No changes were found in the electrocardiogram which could be attributed to either drug. During the period of observation three episodes of slight myocardial ischemia were diagnosed from the electrocardiograms. These findings are to be expected in such a group of patients when frequent tracings are made.

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SUCCESSFUL THERAPEUTIC REGIMEN FOR THE MANAGEMENT OF BEHAVIOR PROBLEMS IN THE ELDERLY

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Those of us who care for elderly patients often "lose sight of the forest because of the leaves on the trees." This is especially true in our approach to those abnormal manifestations that come under the category of mental problems.

We are prone to see the end-result—the mental changes. We see the evidence of confusion, disorientation and loss of memory. We see all these—yet we often fail to realize that it is not the mental changes but the abnormal behavior of the patient that has brought him to our attention. In fact our ability to control the abnormal behavior manifestations is often the margin of difference between successful care at home and commitment to an institution.

Consequently a therapeutic regimen for these patients that would assist in their management at home should be a welcome addition to our medical armamentarium. The recent development of a new group of drugs—variously labelled ataraxics, tranquilizers, relaxants, psychoanaleptics, and neuropsychic, neuropharmacologic or phrenotropic agents—gives promise of a chemotherapeutic program that can be used at home.

CHEMOTHERAPEUTIC REGIMEN

The program is a simple one, but before it can be successfully executed it is mandatory that we understand these new drugs—their limitations, their good and their bad points and the results of their prolonged clinical use. This is important because these new drugs have, like insulin and digitalis, specific indications and contraindications.

The same is true of abnormal behavior. The physician must understand its manifestations, it changes, and its relationship to the drugs.

The logical place to find these answers is the literature. However, during the past year there were over 1,000 scientific papers on the new drugs. If one were to read and abstract all of these, it would lead to but one conclusion, namely, "The new-drug situation is a mess." This is so because in most cases these drugs are being used to treat diagnoses instead of patients. Most of the new drugs act primarily on abnormal behavior, and secondarily on mental mechanisms. It makes a difference whether the behavior is associated with overactivity or underactivity, as most of the new drugs are specific for one type or the other. In order to understand their effects, it is necessary to think of them primarily as drugs for treating behavior and to disregard the psychiatric diagnostic aspect of the problem.

Knowing that the new drugs are rather specific for one or other type of behavior—overactive or underactive—it is evident that, regardless of reports in the literature, none of these drugs will control all behavior problems. This simply

means that today we do not have a single drug that will help all patients, mainly because the behavior of an individual is usually a mixture of overactivity and underactivity. This is true of normal as well as abnormal behavior. None of us carries a full head of steam all the time, just as none of us has his fires banked all the time. However, most of us are able to control ourselves and, consequently, can live with the stresses and strains that confront us each day.

When the response of an individual to the pressures of life is such that he cannot control himself, then we have abnormal behavior. The abnormality may be well covered up, or it may be severe enough to disturb the relatives and neighbors. However, in most people, whether their behavior is normal or abnormal and regardless of the outward behavior manifestations, there is always an element of the opposite behavior.

Thus it would be expected that a combination of drugs—one for overactivity, and one for underactivity—would be more effective than either drug used separately.

Granted that a combination works better, which drugs should be used? During the past two years we have investigated 19 of the new drugs. Many of these are highly active and are useful in special cases. However, for simplicity of administration, minimal incidence of side-reactions, and uniformity of good results we feel that two drugs, reserpine (Serpasil)[1] and methyl-phenidylacetate (Ritalin)[1], are adequate for everyday use in treating the abnormal behavior manifestations of elderly patients.

Combined reserpine and methyl-phenidylacetate therapy

Reserpine is a tranquilizer, and is therefore useful in treating overactive behavior. Methyl-phenidylacetate is a psychoanaleptic—a mental awakener. It is useful in treating underactive behavior. Proper combinations of these two drugs will control, ameliorate or even reverse most elderly behavior problems.

Age, length of illness and the usual physical infirmities of elderly patients are not contraindications to the use of either drug (1).

No special diagnostic or laboratory techniques are needed, although we have used them in more than 300 cases. Clinical observations are the most important criteria for estimating both initial and maintenance dosages. If the medication be adjusted to the clinical picture, the difficulties will be minimal and the benefits maximal.

The use of divided daily dosages will provide smoother action. We prefer a schedule of three doses daily, before, after, or with meals. The tablets may be crushed and put in the food or beverage if necessary.

Elderly patients showing a predominance of overactivity should be given reserpine (Serpasil) initially. A good starting dose is 0.2 mg. three times daily. Those showing a predominance of underactivity should be given methyl-phenidylacetate (Ritalin) initially, starting with 10 mg. three times daily. The elderly

[1] Serpasil is a trade name for reserpine, and Ritalin is a trade name for methyl-phenidylacetate hydrochloride, both supplied by Ciba Pharmaceutical Products, Inc., Summit, New Jersey.

patient who manifests mixed behavior, or about whom you are not sure, may receive both Serpasil and Ritalin initially. A good starting combination is 0.2 mg. of Serpasil and 10 mg. of Ritalin three times daily. With a wide margin of safety, these starting doses may be increased if necessary.

The first change may be within two or three days, or it may take as long as three weeks. Checking the patient every day or two during this period will allow for proper regulation of the dose in order to produce the desired results.

As the clinical behavior pattern of each patient starts to shift toward normal, either the initial dose should be reduced or the second drug added.

In the case of the overactive elderly patient the objective is usually a reduction in motor activity, aggressiveness, or anxiety and tension. When this decrease is observed clinically without any evidence of reduced mental activity, it is time to reduce the dosage of Serpasil gradually before adding Ritalin. If, on the other hand, the reduction in motor activity includes decreased mental activity, it is best to add Ritalin directly. In a few elderly patients, lethargy may be noted before the motor activity or aggressiveness is reduced. This condition is rare, but when it occurs a small amount of both drugs should be added—Ritalin to overcome the lethargy and Serpasil to take care of the motor activity.

The maintenance dosage for most overactive elderly patients is about 0.25 mg. of Serpasil and 5 mg. of Ritalin three times daily. About a fourth of these patients will require a larger regular dose of Serpasil.

In the senile group, the number of underactive patients will be about half or a third that of the overactive patients. I can't tell you why, but it is my belief that a withdrawn, quiet patient loaded with tension, anxiety or resistance should be considered overactive and treated as such. Thus a patient with a furrowed brow and sweaty hands who refuses to follow normal routines—even though he may try to put up a negative front—should be given Serpasil initially and treated as an overactive patient. It is usually because of the confusion and disorientation that these patients resist. They don't understand, so they resort to survival tactics—fighting and resisting.

A truly underactive patient is one without tension, anxiety, or resistance. He can be confused or disoriented. Usually he requires help or prodding to follow daily routines. He follows easily, making few if any decisions for himself.

Ritalin may produce clinical changes in such patients within a couple of days. If there is no change within three or four days the dose should be increased. If, after gradually raising the dosage to 30 mg. three times daily, there is no change for three or four days, it is then advisable to add Serpasil. In most cases this will produce a change; then the drugs can be balanced.

When there is improvement in the negative clinical pattern without evidence of excess motor activity or aggressiveness, the dosage of Ritalin can be gradually reduced. When there is clinical evidence of overactive behavior along with mental awakening, then Serpasil should be added to the Ritalin. Most underactive patients will be maintained on a dosage of about 0.2 mg. of Serpasil and 10 mg. of Ritalin three times daily.

The cause of abnormal behavior is not always known. There will be times when

a balanced patient will be temporarily upset or depressed. The addition of extra amounts of Serpasil or Ritalin for a short time will usually help the patient through these periods of upset.

A comparison with the control of diabetes is in order. If the diabetic overeats, he takes more insulin. If he fasts, he cuts his insulin. A similar adjustment in relation to the amount of mental strain, is needed in the treatment of elderly patients with behavior problems. However, the diabetic cannot make these adjustments unless the reason is explained to him. Therefore, for best results in behavior problems, it is necessary to explain to the patient or his relatives the action of each drug, the results expected from administration, and the symptoms which should be reported to the physician, so that he may adjust the dosage properly in order to reach the desired goal—active tranquillity.

After the patient has reached a balanced state, the dosage of both drugs can be gradually reduced to the maintenance level. In some patients the drugs can be eliminated, but usually senile patients will do better and have a smoother life if kept on a maintenance dosage. Moreover, the relatives of these patients demonstrate less anxiety if the medicines are continued.

2-Ethyl-crotonyl-urea

Not all senile behavior is grossly abnormal when first it comes to the attention of the family doctor. Consequently, there is a large group of elderly patients who need some mild medication for anxiety and tension states—a mild tranquilizer, without the sedative or habit-forming properties of the barbituates. For these patients we have found that 2-ethyl-crotonyl-urea (Nostyn)[2] induces the best clinical response. In a dosage range of 50 to 150 mg. three times daily, its mild action promotes an over-all calmness that makes the patient easier to manage, as well as making him more capable of participating in activities. The low dose required for sedation, and the comparatively high dose required for hypnosis make it a valuable drug for senile patients who do not tolerate the more potent tranquilizers.

General

Thus, it is possible with three drugs—Serpasil, Ritalin and Nostyn—to control, ameliorate and prevent the abnormal behavior manifestations of elderly patients. However, these drugs by themselves are not the answer. They do not have the power to restore the senile patient, although they can produce within him the ability to participate. Total improvement will be almost directly proportion to the amount of help and tender loving care the patient receives.

If there is certainty that the patient will be aided and reassured, and then reassured again as the drugs act to cause a lessening of his confusion and an increase in his orientation, then the physician can tell those taking care of the patient that there will be a trend toward a more productive, normal activity.

[2] Nostyn is a trade name for 2-ethyl-crotonyl-urea, supplied by Ames Company, Inc., Elkhart, Indiana.

There will be an improvement in the patient's ability to cooperate and a new interest in his outlook on life, and himself. He will enjoy himself more, sleep and eat better and take better care of himself. An important factor is that the relatives can be told that he will need less special care and attention, and that in all probability he can be managed without having to be committed to a mental hospital.

I do not know how many of your elderly patients with behavior problems will end up in an institution, but I do know that by your early detection and treatment of their abnormal behavior you will reduce the number and make this a much better world in which to grow old.

REFERENCE

1. FERGUSON, J. T., AND FUNDERBURK, W. H.: Improving senile behavior with reserpine and Ritalin, *J. A. M. A.* **160:** 259–263 (Jan. 28) 1956.

MORBIDITY AND MORTALITY IN OLD AGE

A Study of Experience in a Modern Home for the Aged. Part VI*

ISRAEL GITLITZ, Dr. P.H.†

INTERPRETATION OF RESULTS—MORTALITY

The mortality experience of the residents of the Home for Aged and Infirm Hebrews was studied by methods described in Part IV and included the following components: 1) the life table, 2) cause of death, 3) survivorship in selected chronic diseases, and 4) disease-specific and psychiatric mortalities.

The Life Table

The probability of dying for residents of the Home, in five-year age groups, was calculated for each of the three time-periods, 1935–1940, 1941–1945 and 1946–1951. Since the average age of the individuals in each age group was not known and could not be assumed to fall at the mid-point of the range, the most conservative approach possible was taken for purposes of comparison. It was assumed that the derived values applied to the higher end of the age periods. Thus, for the age group 60–64, the q_x was assumed to apply to age 64, for the age group 65–69, to age 69, and so on. These q_x's are recorded in Tables 117 and 118.

No significant differences were observed in the q_x values for the three time-periods (Table 75, Part IV). Therefore, a life table was constructed for the period 1935–1951, using all the data. The results are recorded in Table 69 (Part IV).

The q_x values represent the average annual probability of dying experienced by the residents of the Home during the seventeen-year interval, 1935–1951. These values were plotted, and values for the intermediate years estimated by means of arithmetic interpolation. Complete life tables, beginning at age 60, were then constructed and are shown in Tables 119 and 120.

Comparisons of the q_x values for the Home with those for the United States in 1939–1941 and in 1950 were made and are shown in Table 121 and Figure 2. Residents of the Home had a significantly higher age-specific life-table death rate than did the white population of the United States in 1939–1941 and in 1950. In extreme old age, however, the number of residents of the Home was too small to show statistical significance for the observed differences.

The differential between residents of the Home and the population of the United States in the risk of dying is expressed in somewhat different terms in the survivorship curve of Figure 3. The relatively lower survival rate for residents of the Home is again apparent.

* Part of thesis presented to Yale University for the degree of Doctor of Public Health, 1955. (Parts I–V appeared in the June, July, August, September and October 1956 issues of this journal.) This study was carried out under the auspices of the Medical Services of the Home for Aged and Infirm Hebrews of New York.

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TABLE 117

Annual Probability of Male Residents of the Home for Aged and Infirm Hebrews Dying during Three Time-Periods since 1935

Age	Probability of dying (1000 q_x)		
	1935–1940	1941–1945	1946–1951
64	93.02	113.48	25.00
69	110.97	141.34	43.60
74	125.68	144.68	133.19
79	181.82	235.62	168.82
84	236.97	333.33	231.36
89	374.27	357.89	298.51
94	400.00	432.43	392.86

A comparison of $^{o}e_x$ values for residents of the Home and the white population of the United States is shown in Table 122 and Figure 4. The relatively lower average future lifetimes for residents of the Home is patent. The relatively unfavorable life experiences noted for the residents of the Home was due to their not being a true sample of the white population of the United States in age groups 60 to 94 years.

Cause of Death

Observed deaths at the Home during the period 1935–1948 were allocated to underlying causes according to the rules of the 5th Revision of the International List and the Manual of Joint Causes and are shown in Tables 77 and 78 (Part IV). These observed deaths were compared with the total United States experience by age and by time-period.

Forty-two per cent of the male deaths and 40 per cent of the female deaths were allocated to cardiovascular-renal disease; 26 per cent of the male deaths and 28 per cent of the female deaths were assigned to malignant neoplasms; 17 per cent of the male deaths and 15 per cent of the female deaths were allotted to pneumonia and influenza; 8 per cent of the male deaths and 11 per cent of the female deaths were apportioned to diabetes mellitus; and 3 per cent of the male deaths and 3 per cent of the female deaths were attributed to genito-urinary tract infections; etc. (Tables 123 and 124). On the basis of proportionate mortality in the total United States experience, age groups 60 to 94 years, the anticipated percentages in the Home were: 61 per cent of male deaths and 60 per cent of the female deaths allocated to cardiovascular renal disease; 13 per cent of the male deaths and 15 per cent of the female deaths assigned to malignant neoplasms; 5 per cent of the male deaths and 5 per cent of the female deaths allotted to pneumonia and influenza; 2 per cent of the male deaths and 5 per cent of the female deaths apportioned to diabetes mellitus; 3 per cent of the male and 1 per cent of the female deaths attributed to infections of the genito-urinary tract; etc. (Tables 123 and 124). The differences in cause of death were found to be significant (Tables 79–83, Part IV).

TABLE 118

Annual Probability of Female Residents of the Home for Aged and Infirm Hebrews Dying during Three Time-Periods since 1935

Age	Probability of Dying (1000 q_x)		
	1935–1940	1941–1945	1946–1951
64	126.32	75.95	39.22
69	105.26	128.71	53.98
74	118.18	123.91	100.96
79	167.72	182.49	153.56
84	250.00	243.47	166.28
89	261.90	342.11	226.12
94	285.71	368.42	227.78

TABLE 119

Life Table, Male Residents of the Home for the Aged and Infirm Hebrews, 1935–1951

[1] x to $x+1$	[2] 1000 q_x	[3] l_x	[4] d_x	[5] L_x	[6] T_x	[7] $\mathring{e}_x$
60 to 61	55.55	100,000	5,555	97,222	98,733	9.83
61 to 62	60.05	94,445	5,671	91,609	885,511	9.38
62 to 63	66.66	88,774	5,918	85,815	793,902	8.94
63 to 64	71.17	82,856	5,897	79,907	708,087	8.55
64 to 65	77.52	76,959	5,966	73,796	628,180	8.16
65 to 66	83.77	70,993	5,947	68,019	554,204	7.81
66 to 67	88.88	65,046	5,781	62,155	486,185	7.47
67 to 68	93.38	59,265	5,534	56,498	424,030	7.15
68 to 69	100.00	53,731	5,373	51,044	367,532	6.84
69 to 70	105.47	48,358	5,102	45,807	316,488	6.54
70 to 71	111.11	43,256	4,806	40,853	270,681	6.26
71 to 72	117.41	38,450	4,514	36,193	229,828	5.98
72 to 73	122.22	33,936	4,148	31,862	193,635	5.71
73 to 74	126.02	29,788	3,754	27,911	161,773	5.43
74 to 75	133.59	26,034	3,478	24,295	133,862	5.14
75 to 76	144.44	22,556	3,258	20,927	109,567	4.86
76 to 77	155.55	19,298	3,002	17,797	88,640	4.59
77 to 78	169.66	16,296	2,765	14,913	70,843	4.35
78 to 79	177.77	13,531	2,406	12,328	55,930	4.13
79 to 80	188.16	11,125	2,093	10,078	43,602	3.92
80 to 81	200.00	9,032	1,806	8,129	33,524	3.71
81 to 82	213.11	7,226	1,540	6,456	25,395	3.51
82 to 83	224.22	5,686	1,275	5,048	18,939	3.33
83 to 84	237.33	4,411	1,047	3,887	13,891	3.15
84 to 85	250.00	3,364	841	2,943	10,004	2.97
85 to 86	266.66	2,523	673	2,186	7,061	2.80
86 to 87	287.08	1,850	531	1,584	4,875	2.64
87 to 88	300.00	1,319	396	1,121	3,291	2.50
88 to 89	313.11	923	289	778	2,170	2.35
89 to 90	333.33	634	211	528	1,392	2.20
90 to 91	346.24	423	146	350	864	2.04
91 to 92	362.15	277	100	227	514	1.86
92 to 93	373.57	177	66	144	287	1.62
93 to 94	386.88	111	43	89	143	1.29
94 to 95	402.12	68	27	54	54	0.79

TABLE 120

Life Table, Female Residents of the Home for the Aged and Infirm Hebrews, 1935–1951

[1] x to $x+1$	[2] $1000\,q_x$	[3] l_x	[4] d_x	[5] L_x	[6] T_x	[7] $\mathring{e}_x$
60 to 61	74.46	1000,000	7446	96,277	994,063	9.94
61 to 62	75.57	92,554	6994	89,057	897,786	9.70
62 to 63	77.77	85,560	6654	82,233	808,729	9.45
63 to 64	78.87	78,906	6223	75,794	726,496	9.21
64 to 65	79.71	72,683	5794	69,786	650,702	8.95
65 to 66	82.17	66,889	5496	64,141	580,916	8.68
66 to 67	83.00	61,393	5096	58,845	516,775	8.42
67 to 68	84.37	56,297	4750	53,922	457,930	8.13
68 to 69	85.97	51,547	4431	49,331	404,008	7.84
69 to 70	87.57	47,116	4126	45,053	354,677	7.53
70 to 71	90.00	42,990	3869	41,055	309,624	7.20
71 to 72	96.58	39,121	3778	37,323	268,569	6.87
72 to 73	102.20	35,343	3612	33,537	231,337	6.55
73 to 74	106.60	31,731	3383	30,039	197,800	6.23
74 to 75	112.06	28,348	3177	26,759	167,761	5.92
75 to 76	122.22	25,171	3076	23,633	141,002	5.60
76 to 77	137.73	22,095	3043	20,573	117,369	5.31
77 to 78	144.44	19,052	2752	17,676	96,796	5.08
78 to 79	155.55	16,300	2535	15,032	79,120	4.85
79 to 80	164.24	13,765	2261	12,634	64,008	4.66
80 to 81	171.06	11,504	1968	10,520	51,454	4.47
81 to 82	177.77	9,536	1695	8,688	40,934	4.29
82 to 83	183.58	7,841	1439	7,121	32,246	4.11
83 to 84	192.18	6,402	1230	5,787	25,125	3.92
84 to 85	199.41	5,172	1031	4,656	19,338	3.74
85 to 86	210.01	4,141	870	3,706	14,682	3.55
86 to 87	220.22	3,271	720	2,911	10,796	3.36
87 to 88	231.13	2,551	590	2,256	8,065	3.16
88 to 89	242.23	1,961	475	1,723	5,809	2.96
89 to 90	254.50	1,486	378	1,297	4,086	2.75
90 to 91	262.25	1,108	292	962	2,789	2.52
91 to 92	273.26	816	223	704	1,827	2.24
92 to 93	282.17	593	167	509	1,123	1.89
93 to 94	292.88	426	128	362	612	1.44
94 to 95	304.34	298	91	252	252	0.85

Deaths allocated to underlying causes in accordance with the stipulations of the 6th Revision of the International List of Diseases and Causes of Death, adopted in 1948, were determined for the period 1949–1950, and are listed in Table 85 (Part IV). Thirty-four per cent of the male deaths and 35 per cent of the female deaths were allotted to diseases of the cardiovascular system; 20 per cent of the male and 24 per cent of the female deaths were assigned to malignant neoplasms; 16 per cent of the male deaths and 13 per cent of the female deaths were allocated to pneumonia and influenza; 5 per cent of the male deaths and 7 per cent of the female deaths were apportioned to diabetes mellitus; 14 per cent of the male deaths and 16 per cent of the female deaths were attributed to vascular lesions affecting the central nervous system; etc. (Tables 125 and 126).

TABLE 121

Comparison of Probability of Dying: Residents of the Home for Aged and Infirm Hebrews, 1935–1951, and White Population of the United States, 1939–1941 and 1950

Age	Probability of Dying (1000 q_x)					
	Male			Female		
	Home	U. S. 1939–1941	U. S. 1950	Home	U. S. 1939–1941	U. S. 1950
60	55.55	25.57	23.58	74.76	17.21	13.16
61	60.05	27.52	25.50	75.57	18.76	14.46
62	66.66	29.62	27.50	77.77	20.42	15.81
63	71.17	31.90	29.60	78.87	22.27	17.20
64	77.52	34.36	31.92	79.71	24.31	18.70
65	83.77	37.07	34.13	82.17	26.58	20.26
66	88.88	40.02	36.62	83.00	29.13	22.03
67	93.38	43.23	39.39	84.37	31.99	24.17
68	100.00	46.78	42.51	85.97	35.19	26.79
69	105.47	50.64	45.95	87.57	38.75	29.85
70	111.11	54.89	49.68	90.00	42.72	33.16
71	117.41	59.61	53.66	96.58	47.08	36.70
72	122.22	64.78	57.94	102.20	51.89	40.57
73	126.02	70.46	62.53	106.60	57.18	44.84
74	133.59	76.65	67.44	112.06	62.95	49.50
75	144.44	83.39	72.74	122.22	69.22	54.54
76	155.55	90.68	78.41	137.73	76.01	59.95
77	169.66	98.51	84.54	144.44	83.31	65.73
78	177.77	106.89	91.12	155.55	91.21	71.84
79	188.16	115.89	98.11	164.24	99.70	78.29
80	200.00	125.52	105.48	171.06	108.82	85.09
81	213.11	135.87	113.13	177.77	118.64	92.22
82	224.22	146.94	120.70	183.58	129.21	99.57
83	237.33	158.77	127.83	192.18	140.53	107.00
84	250.00	171.20	133.70	199.41	152.55	114.17
85	266.66	184.11	146.40	210.01	165.09	120.00
86	287.08	197.31	162.10	220.22	178.06	138.80
87	300.00	210.61	180.00	231.18	191.34	155.50
88	313.11	223.91	192.50	242.24	204.85	172.50
89	333.33	237.24	207.00	254.50	218.60	187.70
90	346.24	250.63	224.00	263.25	232.60	202.00

On comparing these causes of death in the Home with the total United States experience by the method of proportionate mortality, the expected percentages were: 49 per cent of the male deaths and 47 per cent of the female deaths allocated to cardiovascular diseases; 20 per cent of the male and 22 per cent of the female deaths attributed to malignant neoplasms; 2 per cent of the male deaths and 2 per cent of the female deaths assigned to pneumonia and influenza; 1 per cent of the male deaths and 3 per cent of the female deaths allotted to diabetes mellitus; 11 per cent of the male and 14 per cent of the female deaths apportioned to vascular lesions affecting the central nervous system; etc. (Tables 125 and 126). These differences were also shown to be significant (Tables 86 and 87, Part IV).

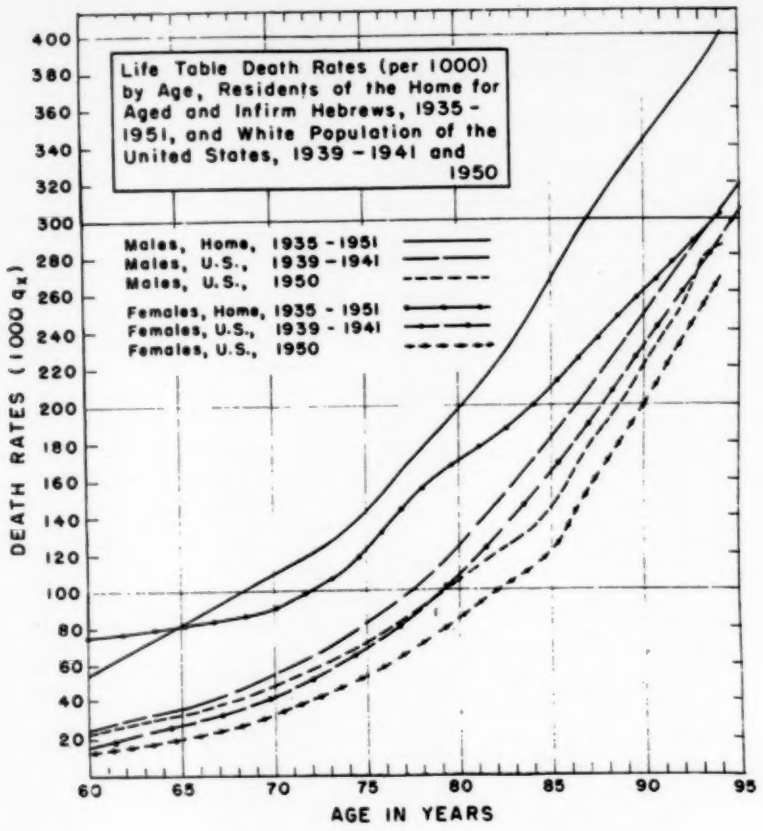

FIGURE 2

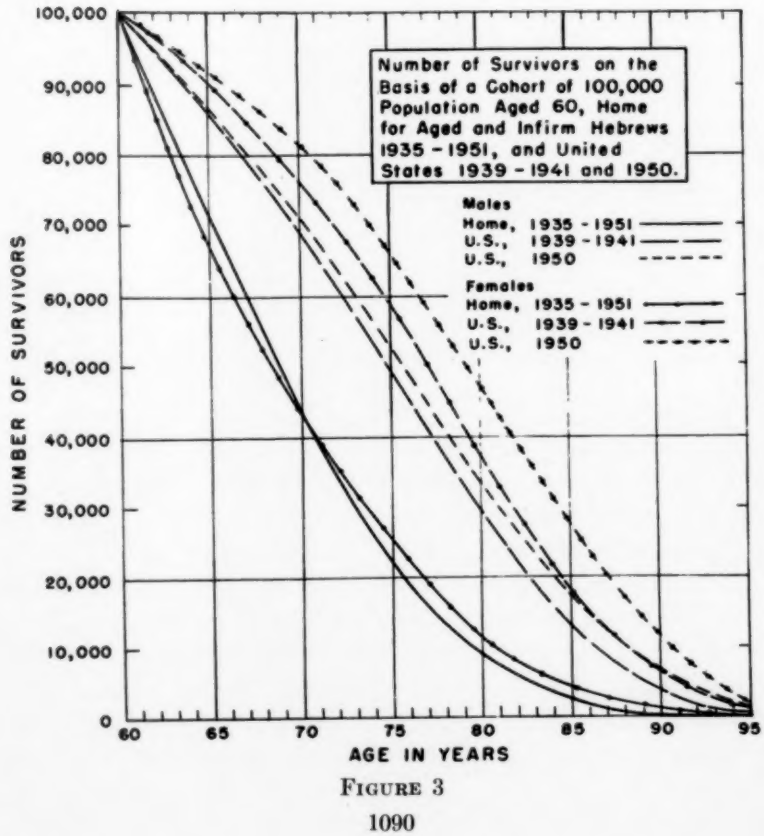

FIGURE 3

TABLE 122

Comparison of Average Future Lifetimes ($^{o}e_x$): Residents of the Home for Aged and Infirm Hebrews, 1935–1941, and White Population of the United States, 1939–1941 and 1950

Age	Average Future Lifetimes ($^{o}e_x$)					
	Males			Females		
	Home	U. S. 1939–1941	U. S. 1950	Home	U. S. 1939–1941	U. S. 1950
60	9.83	15.00	15.95	9.94	16.94	18.97
61	9.38	14.38	15.33	9.70	16.23	18.22
62	8.94	13.77	14.71	9.45	15.53	17.48
63	8.55	13.18	12.12	9.21	14.85	16.75
64	8.16	12.59	13.53	8.95	14.17	16.03
65	7.81	12.02	12.96	8.68	13.51	15.33
66	7.47	11.47	12.40	8.42	12.87	14.64
67	7.15	10.92	11.85	8.13	12.24	13.96
68	6.84	10.40	11.31	7.84	11.63	13.29
69	6.54	9.88	10.79	7.53	11.03	12.64
70	6.26	9.38	10.29	7.20	10.46	12.01
71	5.98	8.90	9.80	6.87	9.90	11.41
72	5.71	8.43	9.33	6.55	9.37	10.82
73	5.43	7.98	8.87	6.23	8.85	10.26
74	5.14	7.55	8.43	5.92	8.36	9.72
75	4.86	7.13	8.00	5.60	7.89	9.20
76	4.59	6.73	7.60	5.31	7.44	8.71
77	4.35	6.36	7.20	5.08	7.01	8.23
78	4.13	6.00	6.82	4.85	6.60	7.78
79	3.92	5.65	6.45	4.66	6.21	7.34
80	3.71	5.33	6.10	4.47	5.84	6.92
81	3.51	5.02	5.79	4.29	5.49	6.54
82	3.33	4.73	5.46	4.11	5.17	6.16
83	3.15	4.46	5.14	3.92	4.86	5.78
84	2.97	4.21	4.82	3.74	4.57	5.42
85	2.80	3.97	4.49	3.55	4.30	5.05
86	2.64	3.70	4.33	3.36	4.06	4.83
87	2.50	3.56	4.16	3.16	3.83	4.64
88	2.35	3.38	3.98	2.96	3.61	4.43
89	2.20	3.21	3.82	2.75	3.42	4.20
90	2.04	3.05	3.67	2.52	3.23	4.04
91	1.86	2.90	3.50	2.24	3.06	3.83
92	1.62	2.76	3.30	1.89	2.90	3.61
93	1.29	2.63	3.14	1.44	2.75	3.42
94	0.79	2.51	2.96	0.85	2.61	3.20

Discussion of results of χ^2 tests

It is of interest that individual χ^2's contributed more than enough to make the total χ^2 significant. At least half of the individual contributions to χ^2 would be significant by themselves at 1° of freedom level (Tables 79–84, Part IV). On further investigation of Tables 79–84, one recognizes that the contributions to χ^2 by individual causes of death that contribute more than enough to make the total χ^2 significant are similar for both males and females in all periods except

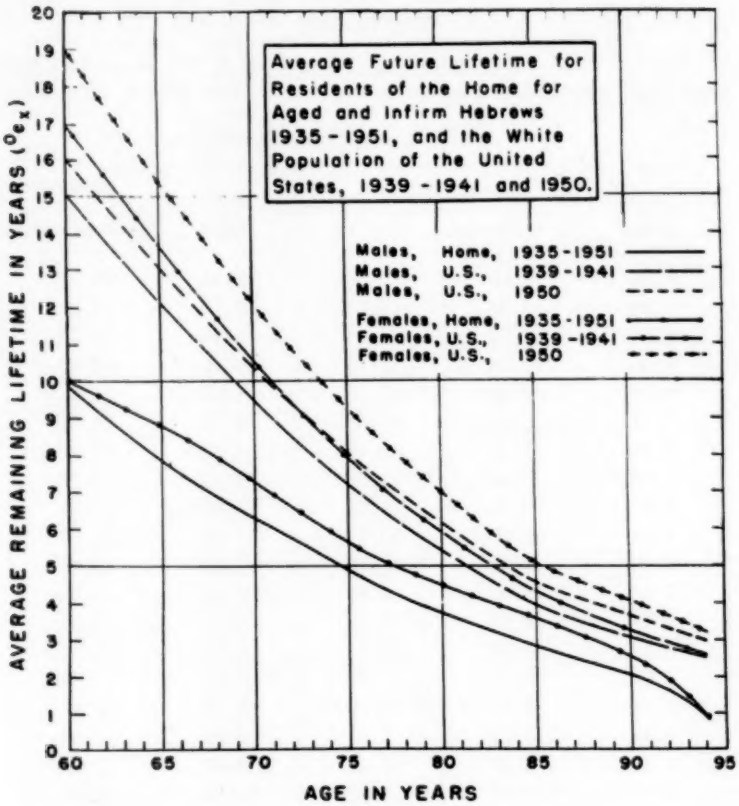
Average Future Lifetime for Residents of the Home for Aged and Infirm Hebrews 1935 - 1951, and the White Population of the United States, 1939 - 1941 and 1950.
Males, Home, 1935-1951
Males, U.S., 1939-1941
Males, U.S., 1950
Females, Home, 1935-1951
Females, U.S., 1939-1941
Females, U.S., 1950
AVERAGE REMAINING LIFETIME IN YEARS ($^{o}e_{x}$)
AGE IN YEARS
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
60 65 70 75 80 85 90 95

FIGURE 4

1946–1948. This is also supported by noting the identical condition in Tables 86 and 87 (Part IV), in which the data are compared with those of the next time-period (1949–1950).

In 5 of the 8 tests, pneumonia and influenza had χ^2 values that contributed more than enough to make the total χ^2 significant (Tables 79–84 and 86–87).

The χ^2 values in the time-period 1949–1950, for both sexes, were much smaller than those values for the other two time-periods because of smaller sample sizes.

It is also evident that both male and female total χ^2 values are extremely large. If the Home were a true sample of the white population of the United States, the probability of observing such large χ^2 values is so slight as almost to approach the impossible. Therefore, it is assumed that the population of the Home is not a true sample of the United States as regards causation of death within the age group 60 to 94 years.

Certain important considerations should be pointed out which tend to emphasize the differences between causes of death in the Home and in the population of the United States, aged 60 to 94 years. It is conceivable that residents of the Home, when compared to the white population of the United States of similar age, were more prone to certain diseases (pneumonia and influenza) because of heredito-constitutional factors, and less susceptible to others (peptic

TABLE 123

Comparison of Observed Deaths in Male Residents of the Home for Aged and Infirm Hebrews, Aged 60–94, 1935–1948, with Expected Deaths, on the Basis of the 1935–1948 Mortality Experience of the Population of the United States, Aged 60–94

Cause of Death	Observed		Expected	
	No.	% Total	No.	% Total
Coronary disease	87	23.0	44.2	11.6
Intracranial lesions of vascular origin	31	8.2	42.6	11.2
Nephritis	20	5.3	29.5	7.8
Other cardiovascular	22	5.8	114.2	30.1
Total cardiovascular-renal	160	42.3	230.5	60.7
Neoplasms of digestive tract	51	13.5	25.7	6.8
Other carcinomas and malignant tumors	48	12.7	24.1	6.4
Total carcinoma and other malignant tumors	99	26.2	49.8	13.2
Pneumonia and influenza	63	16.7	18.5	4.9
Diabetes mellitus	30	7.9	8.4	2.2
Genito-urinary tract infections	12	3.2	10.3	2.7
Tuberculosis	10	2.6	6.7	1.8
Accidents	4	1.0	16.8	4.4
All other diseases	0		38.3	10.1
Total	378	99.9	379.3	100.0

TABLE 124

Comparison of Observed Deaths in Female Residents of the Home for Aged and Infirm Hebrews, 1935–1948, with Expected Deaths on the Basis of the 1935–1948 Mortality Experience of the Population of the United States, Aged 60–94

Cause of Death	Observed		Expected	
	No.	% Total	No.	% Total
Coronary disease	71	20.00	27.70	7.83
Intracranial lesions of vascular origin	31	8.73	45.80	12.95
Nephritis	20	5.63	28.60	8.09
All other cardiovascular	19	5.35	111.90	31.64
Total cardiovascular-renal	141	39.71	214.00	60.50
Malignant neoplasms of digestive tract	46	12.96	25.30	7.15
All other malignant neoplasms	55	15.49	26.40	7.46
Total malignant neoplasms	101	28.45	51.70	14.62
Pneumonia and influenza	53	14.93	17.50	4.95
Diabetes mellitus	39	10.99	16.00	4.52
Genito-urinary tract infections	11	3.10	3.40	0.96
Tuberculosis	7	1.97	3.30	0.93
Accidents	3	0.85	16.00	4.52
All other diseases	0	0.00	31.80	9.00
Total	355	100.00	353.70	100.01

TABLE 125

Comparison of Observed Deaths in Male Residents of the Home for Aged and Infirm Hebrews, 1949 and 1950, with Expected Deaths on the Basis of the 1949 and 1950 Mortality Experience of the Population of the United States, Aged 60–94

Cause of Death	Observed		Expected	
	No.	% Total	No.	% Total
Arteriosclerotic heart disease, including coronary disease	7	15.91	12.75	28.97
Hypertensive cardiovascular disease. Hypertensive vascular disease	5	11.36	2.78	6.32
Other disease of the circulatory system	3	6.81	6.05	13.75
Total cardiovascular	15	34.08	21.58	49.03
Vascular lesions affecting the central nervous system	6	13.64	4.79	10.88
Pneumonia and influenza	7	15.91	1.11	2.52
Diabetes mellitus	2	4.55	0.59	1.34
Malignant neoplasms of the digestive organs	4	9.09	2.88	6.54
All other malignant neoplasms	5	11.36	6.06	13.77
Total malignant neoplasms	9	20.45	8.94	20.31
Accidents	0	0.00	2.39	5.43
All others	5	11.36	4.61	10.47
Total	44	99.99	44.01	99.99

TABLE 126

Comparison of Observed Deaths in Female Residents of the Home for Aged and Infirm Hebrews, 1949 and 1950, with Expected Deaths on the Basis of the 1949 and 1950 Mortality Experience of the Population of the United States, Aged 60–94

Cause of Death	Observed		Expected	
	No.	% Total	No.	% Total
Arteriosclerotic heart disease, including coronary disease	8	14.55	12.52	22.76
Hypertensive cardiovascular disease. Hypertensive vascular disease	8	14.55	5.01	9.11
Other disease of the circulatory system	3	5.45	8.35	15.18
Total cardiovascular	19	34.55	25.88	47.06
Vascular lesions affecting the central nervous system	9	16.36	7.61	13.84
Pneumonia and influenza	7	12.73	1.35	2.45
Diabetes mellitus	4	7.27	1.55	2.82
Malignant neoplasms of the digestive organs	5	9.09	3.61	6.56
All other malignant neoplasms	8	14.55	8.33	15.15
Total malignant neoplasms	13	23.64	11.94	21.71
Accidents	0	0.00	1.87	3.40
All others	3	5.45	4.80	8.73
Total	55	100.00	55.00	100.00

TABLE 127

Observed Deaths in the Home for the Aged and Infirm Hebrews, by Underlying Causes, by Age, and by Time-Period

Cause of Death	Males									Total
	1935–1940			1941–1945			1946–1951			
	Age			Age			Age			
	60–74	75–84	85–94	60–74	75–84	85–94	60–74	75–84	85–94	
I. All cardiovascular diseases except	14	12	5	10	16	5	7	23	6	98
A. Coronary disease	19	17	2	12	17	3	4	19	5	98
B. Intracranial lesions of vascular origin	12	13	1	5	8	2	4	19	5	69
C. Chronic nephritis	2	2	1	1	0	1	1	4	2	14
II. Pneumonia and influenza	6	7	2	8	12	6	3	19	6	69
III. Diabetes mellitus	3	3	3	2	2	0	1	5	2	21
IV. Tuberculosis (all forms)	0	0	1	1	1	2	2	5	2	14
V. Accidents (all forms)	0	0	0	0	1	0	0	0	0	1
VI. Carcinoma and other malignant tumours, except	5	2	1	5	3	2	7	9	5	39
A. Neoplasms of digestive tract and peritoneum	5	6	2	3	6	0	5	11	2	40
VII. Genito-urinary tract infections	2	2	2	1	1	0	2	2	1	13
VIII. All other diseases	0	0	0	0	0	0	0	0	0	0
Total	68	64	20	48	67	21	36	116	36	476

ulcer and thyrotoxicosis) because the protective atmosphere of the Home tends to minimize stress. In addition, patients at the Home were a highly selected group, admitted after vigorous mental and physical screening, thus eliminating those with acute and chronic infections, those demanding excessive custodial care, and those who were mentally ill and accident-prone; they were afforded a far higher standard of medical care than the total population of the United States for similar age groups.

Lastly, whereas the listed causes of death for the total United States population were mainly based on information from death certificates, those for the Home were mainly derived from autopsy protocols or from study of hospital reports following thorough work-ups. The status of a resident of the Home is to be contrasted with the status of the average old person who lives alone or with relatives, in a rooming or boarding house, or perhaps in a nursing home, and receives the very minimum of medical care. Causes of death in these persons may not be reported with the same accuracy and completeness as they are in the Home, due to variations in the ability of the attending physician to make a proper diagnosis because of unavailability of diagnostic tools and, perhaps, due to the lack of care with which the death certificates are completed.

A total, continuous picture of mortality at the Home is given in Tables 127 and 128, in which observed deaths for the entire period of the study, 1935–1951, are allocated by underlying causes, according to rules of the 6th Revision. Dur-

TABLE 128

Observed Deaths in the Home for the Aged and Infirm Hebrews, by Underlying Causes, by Age, and by Time-Period

Cause of Death	*Females*									Total
	1935–1940			1941–1945			1946–1951			
	Age			Age			Age			
	60–74	75–84	85–94	60–74	75–84	85–94	60–74	75–84	85–94	
I. All cardiovascular diseases except	11	16	5	11	19	5	9	22	6	104
A. Coronary disease	9	12	6	8	10	2	8	18	3	76
B. Intracranial lesions of vascular origin	12	9	1	6	9	3	6	23	6	75
C. Chronic nephritis	0	1	1	1	2	1	2	3	1	12
II. Pneumonia and influenza	5	4	1	3	11	4	3	18	5	54
III. Diabetes mellitus	3	2	0	2	3	1	3	9	4	27
IV. Tuberculosis (all forms)	2	1	0	1	2	0	1	3	2	12
V. Accidents (all forms)	0	0	0	1	0	0	0	0	0	1
VI. Carcinoma and other malignant tumours, except	2	3	1	7	10	2	10	13	7	55
A. Neoplasms of digestive tract and peritoneum	3	6	0	1	5	2	4	8	5	34
VII. Genito-urinary tract infections	1	1	0	0	1	0	1	0	0	4
VIII. All other diseases	0	0	0	0	0	0	0	0	0	0
Total	48	55	15	41	72	20	47	117	39	454

ing 1935 to 1951, coronary disease accounted for 21 per cent of all male deaths and 17 per cent of all female deaths; intracranial lesions of vascular origin caused 14 per cent of all male deaths and 16 per cent of all female deaths; chronic nephritis contributed 3 per cent of all male deaths and 3 per cent of all female deaths; 14 per cent of the total male deaths and 12 per cent of all the female deaths were attributed to pneumonia and influenza; 4 per cent of all male deaths and 12 per cent of all the female deaths were allotted to diabetes mellitus; tuberculosis was listed as causing 3 per cent of all male and female deaths; carcinoma (all forms) caused 16 per cent of all male and 19 per cent of all female deaths; and genito-urinary tract infections caused 3 per cent of the total male deaths and 0.9 per cent of all female deaths.

The foregoing data could not be compared with the total United States experience for the same period, due to discontinuity in statistics resulting from changes both in method of selection of underlying causes of death and in the nomenclature.

However, the various causes of death were compared internally by age and by time-period for both sexes, and no significant differences were noted (Tables 88–91, Part IV).

An eleven-year sampling (1935–1945) was taken to compare the effects of the changes in methods of selecting the underlying cause of death. To maintain con-

tinuity of statistics of causes of death, the nomenclature of the 5th Revision was retained as far as possible, since the major portion of the total study (1935–1948) pertained to the period during which the 5th Revision was used (Tables 92 and 93, Part IV).

A study of the ratios or conversion factors (5th/6th Revision) showed sex differences in only two diseases. Thus, the number of deaths allocated to coronary disease showed an increase in males (conversion factor, 0.9) and a decrease in females (conversion factor, 1.1); whereas deaths attributed to tuberculosis showed no change in males, though increasing in females (conversion factor, 0.7) (Tables 92 and 93, Part IV). For all other diseases and conditions, when increases or decreases were observed in the allocation of deaths due to difference in method of obtaining the underlying cause of death, a similar type of change was noted for each sex.

When the over-all effects of allocating disease to underlying cause by two different methods were compared, the resulting changes were found to be highly significant (Tables 94 and 95, Part IV). These differences were attributed to one prime factor: Subsequent to 1949 the determination of the underlying cause of death became the responsibility of the physician, in order to ensure that the mortality statistics would reflect the actual frequencies of the underlying causes of death; whereas prior to 1949 a manual was used to allocate the cause of death, and this manual gave precedence arbitrarily to communicable disease, cancer and allied diseases, and diabetes mellitus, in an attempt to make the mortality statistics reflect the morbidity.

Survivorship in Chronic Disease

Using actuarial methods, a follow-up study was carried out on residents of the Home in the period 1935 through 1951 who had one of the three chronic diseases selected for study. Five-year and ten-year survival rates were computed and it was determined that 24 per cent of the males and 26 per cent of the females with coronary disease survived for five years, and 11 per cent of the males and 7 per cent of the females survived for ten years; 49 per cent of the males and 32 per cent of the females with diabetes mellitus survived five years, and 20 per cent of the males and 7 per cent of the females survived ten years; 28 per cent of the males with hypertension and 37 per cent of the females with hypertension survived five years, and 11 per cent of the males and 12 per cent of the females survived ten years (Table 129, and Tables 96–101, Part IV). No significant differences in survival were noted by sex (Tables 130–135).

Comparison was then made with the proportion surviving in groups of the same age and sex drawn from the general population of the Home, as derived from the life tables of the Home (Tables 136–139). Since the average age on detection of these chronic diseases was 73.4 years, comparison was made graphically with the survival values for residents, aged 73 (Figs. 5 and 6). The proportion of the general population of the Home surviving for five years was 45 per cent for males and 51 per cent for females; the proportion surviving ten years was 15 per cent for males and 20 per cent for females.

TABLE 129

Results of Follow-Up of All Residents of the Home for Aged and Infirm Hebrews, Age 73, 1935–1951, and of Residents with Three Selected Chronic Diseases

	Males				*Females*			
	Diabetes Mellitus	Hyper-tension	Coronary Disease	All Residents	Diabetes Mellitus	Hyper-tension	Coronary Disease	All Residents
Average age in years, on entry into the study...	74.2	73.2	73.3	73	73.4	73.4	73.1	73
Five-year survival rates.....	49.3%	27.6	23.7	45.4	32.4	37.0	25.7	51.4
Ten-year survival rates.....	20.1%	11.3	9.0	14.8	7.1	11.9	6.7	20.2

TABLE 130

Comparison of Five-Year Survival Rates for Residents of the Home for Aged and Infirm Hebrews (1935–1951) with Coronary Heart Disease, by Sex

	Died	Survived	Total	Five-Year Survival Rates
Males	97	32	129	23.71
Females	83	31	114	25.70
Total	180	63	243	$25.93 = p_0$

$$\sigma p_1 - p_2 = \sqrt{\frac{(25.93)(74.1)}{129} + \frac{(25.93)(74.1)}{114}}$$

$$= \sqrt{31.74} = 5.63$$

$$\text{Dev}/\sigma = \frac{1.99}{5.63} = 0.35$$

TABLE 131

Comparison of Ten-Year Survival Rates for Residents of the Home for Aged and Infirm Hebrews (1935–1951) with Coronary Heart Disease, by Sex

	Died	Survived	Total	Ten-Year Survival Rate
Males	115	14	129	9.00
Females	106	8	114	6.67
Total	221	22	243	$9.05 = p_0$

$$\sigma p_1 - p_2 = \sqrt{\frac{(90.95)(9.05)}{129} + \frac{(90.95)(9.05)}{114}}$$

$$= \sqrt{13.60} = 3.69$$

$$\text{Dev}/\sigma = \frac{2.33}{3.69} = 0.63$$

TABLE 132

Comparison of Five-Year Survival Rates for Diabetic Residents of the Home for Aged and Infirm Hebrews (1935–1951), by Sex

	Died	Survived	Total	Five-Year Survival Rates
Males	32	24	56	37.64
Females	48	24	72	32.45
Total	80	48	128	$37.50 = p_0$

$$\sigma p_1 - p_2 = \sqrt{\frac{(62.50)(37.50)}{56} + \frac{(62.50)(37.50)}{72}}$$

$$= \sqrt{74.40} = 8.63$$

$$\text{Dev}/\sigma = \frac{5.19}{8.63} = 0.60$$

TABLE 133

Comparison of Ten-Year Survival Rates for Diabetic Residents of the Home for Aged and Infirm Hebrews (1935–1951), by Sex

	Died	Survived	Total	Ten-Year Survival Rates
Males	47	9	56	4.53
Females	66	6	72	7.05
Total	113	15	128	$11.71 = p_0$

$$\sigma p_1 - p_2 = \sqrt{\frac{(11.7)(88.3)}{56} + \frac{(11.7)(88.3)}{72}}$$

$$= \sqrt{32.80} = 5.73$$

$$\text{Dev}/\sigma = \frac{2.52}{5.73} = 0.44$$

TABLE 134

Comparison of Five-Year Survival Rates for Hypertensives, Residents in the Home for Aged and Infirm Hebrews (1935–1951), by Sex

	Died	Survived	Total	Five-Year Survival Rates
Males	121	47	168	27.57
Females	181	108	289	36.99
Total	302	155	455	$32.92 = p_0$

$$\sigma p_1 - p_2 = \sqrt{\frac{(66.08)(33.92)}{168} + \frac{(66.08)(33.92)}{289}}$$

$$= \sqrt{21.09} = 4.59$$

$$\text{Dev}/\sigma = \frac{9.42}{4.59} = 2.05$$

TABLE 135

Comparison of Ten-Year Survival Rates for Hypertensives, Residents in the Home for Aged and Infirm Hebrews (1935–1951), by Sex

	Died	Survived	Total	Ten-Year Survival Rates
Males	147	21	168	11.32
Females	251	38	289	11.85
Total	398	59	457	12.91 = p_0

$$\sigma p_1 - p_2 = \sqrt{\frac{(87.09)(12.91)}{168} + \frac{(87.09)(12.91)}{289}}$$

$$= \sqrt{10.58} = 3.25$$

$$\text{Dev}/\sigma = \frac{0.53}{3.25} = 0.16$$

TABLE 136

Comparison of the Number of Female Residents of the Home for Aged and Infirm Hebrews with Selected Chronic Diseases Surviving for Five Years Compared with the Expected Number of Survivors, Assuming a 51.4 Per Cent Five-Year Survival Rate

	f	f'	$(f-f')^2/f'$
Coronary heart disease	27	58.6	17.05
Diabetes mellitus	23	37.0	5.30
Hypertension	105	148.5	12.74
Total	155	244.10	$X^2 = 35.09$ $P < .01$

TABLE 137

Comparison of the Number of Female Residents of the Home for Aged and Infirm Hebrews with Selected Chronic Diseases Surviving for Ten Years Compared with the Expected Number of Survivors, Assuming a 20.2 Per Cent Ten-Year Survival Rate

	f	f'	$(f-f')^2/f'$
Coronary heart Disease	7	23.0	11.13
Diabetes mellitus	5	14.35	6.22
Hypertension	32	58.3	11.87
Total	44	95.8	$X^2 = 29.22$ $P < .01$

TABLE 138

Comparison of the Number of Male Residents of the Home for Aged and Infirm Hebrews with Selected Chronic Diseases Surviving for Five Years Compared with the Expected Number of Survivors Assuming a 45.4 Per Cent Five-Year Survival Rate

	f	f'	$(f-f')^2/f'$
Coronary heart disease	29	58.6	14.95
Diabetes mellitus	19	25.4	1.61
Hypertension	46	76.3	12.03
Total	94	16.03	$X^2 = 28.59$ $P < .01$

TABLE 139

Comparison of the Number of Male Residents of the Home for Aged and Infirm Hebrews with Selected Chronic Diseases Surviving for Ten Years Compared with the Expected Number of Survivors Assuming a 14.81 Per Cent Ten-Year Survival Rate

	f	f'	$(f-f')^2/f'$
Coronary heart disease	11	19.1	3.43
Diabetes mellitus	2	8.3	4.78
Hypertension	17	24.9	2.51
Total	30	52.3	$X^2 = 10.72$ $P < .01$

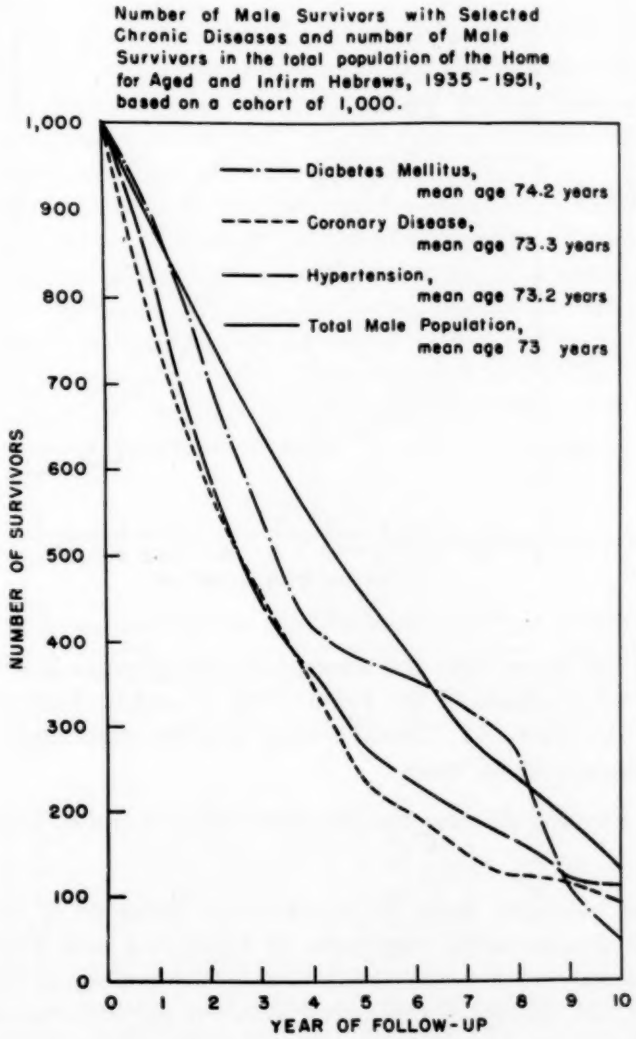
Number of Male Survivors with Selected Chronic Diseases and number of Male Survivors in the total population of the Home for Aged and Infirm Hebrews, 1935 - 1951, based on a cohort of 1,000.
Diabetes Mellitus, mean age 74.2 years
Coronary Disease, mean age 73.3 years
Hypertension, mean age 73.2 years
Total Male Population, mean age 73 years
NUMBER OF SURVIVORS
1,000
900
800
700
600
500
400
300
200
100
0
0 1 2 3 4 5 6 7 8 9 10
YEAR OF FOLLOW-UP

FIGURE 5

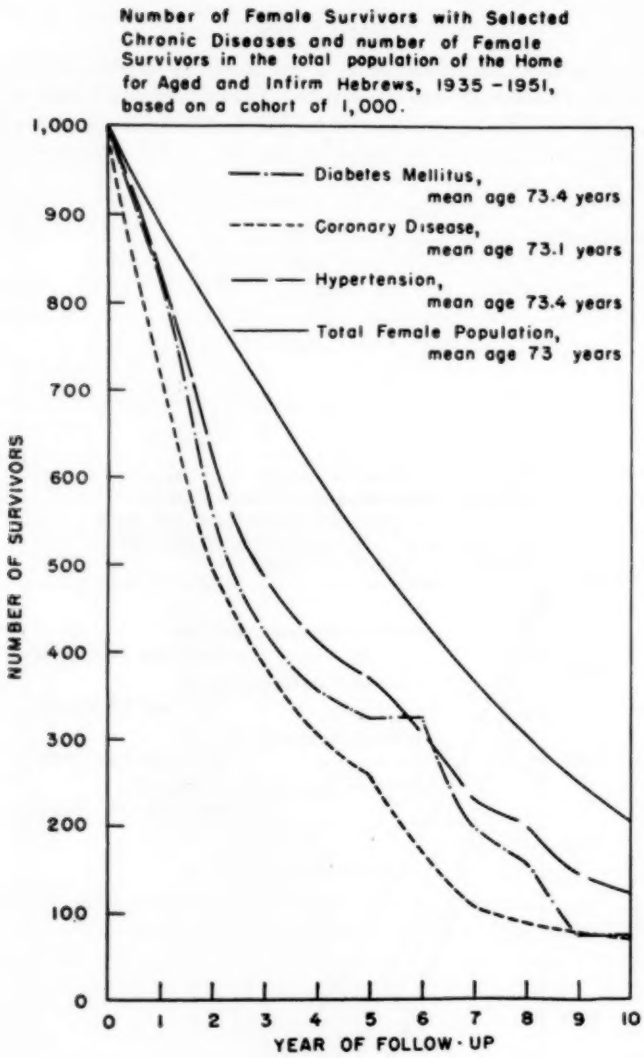
Number of Female Survivors with Selected Chronic Diseases and number of Female Survivors in the total population of the Home for Aged and Infirm Hebrews, 1935 – 1951, based on a cohort of 1,000.
Diabetes Mellitus, mean age 73.4 years
Coronary Disease, mean age 73.1 years
Hypertension, mean age 73.4 years
Total Female Population, mean age 73 years
NUMBER OF SURVIVORS
1,000
900
800
700
600
500
400
300
200
100
0
0 1 2 3 4 5 6 7 8 9 10
YEAR OF FOLLOW-UP

FIGURE 6

Residents of the Home with the selected chronic diseases had lower survival rates than did all residents of the Home (Figs. 5 and 6; Tables 119 and 120; and Tables 96–101, Part IV). The differences between these rates were found to be highly significant in all cases.

Comparison of Physical Disease-Specific Mortality with that in Published Reports

Hypertension

The five-year mortality rates for hypertensive residents of the Home were compared with the mortality experience of Smithwick and Thompson (107)[1], who found a 54 per cent five-year death rate for the males and females studied. Since no significant difference was noted between the five-year mortality rate for the male and female hypertensive patients at the Home (males, 72 per cent; females, 63 per cent) (Table 106, Part IV), comparison was made between the

[1] Part V.

combined mortality rate for both sexes (66 per cent) and the five-year mortality rate of Smithwick and Thompson. The difference between these rates was found to be significant (Table 107, Part IV). This difference may have been due in some measure to the use by Smithwick *et al.* of a combined mortality rate for both sexes. However, it must be noted that patients referred to Smithwick "had unusually severe forms of the disorder, they had not improved with current forms of therapy, or their status indicated an extremely poor prognosis" (107)[1]. In contrast to this situation, most residents of the Home with hypertension tolerated their disease well enough to live to old age.

Coronary disease

Block and associates (108)[1] followed a group of male and female patients with coronary disease and reported a five-year survival rate of 58 per cent and a ten-year survival rate of 37 per cent.

Comparisons were made between the five-year and ten-year survival rates computed for the male and female residents of the Home with coronary disease (Tables 96 and 99, Part IV) and the five-year and ten-year rates of Block and associates. These two rates of survival for both sexes in the Home were found to be significantly lower (Tables 108–111, Part IV).

The differences may be due to the following factors: 1) The average age of detection of the disease for the residents of the Home (males 73 years, females 73 years) was far higher than the corresponding mean age at detection (58.8 years) for the patients in the series of Block and associates. 2) The comparisons were made between two markedly dissimilar social classes (Block's subjects were able to pay for treatment at the Mayo Clinic, whereas the residents of the Home were destitute), with all the implications associated with such disparity. 3) Block does not give survival rates by sex.

TABLE 140

*Comparison of Results of Follow-Up of Residents of the Home with Results of Camargo and Preston**

Years of Follow-Up	Cumulative Probability of Surviving During Specified and Preceding Years				
	Home for the Aged and Infirm Hebrews			Experience of Camargo and Preston [4]	Dev.† / σ [5]
	Males [1]	Females [2]	Combined Experience [3]		
0–1	49.95	66.67	59.18	53.46	0.96
1–2	25.91	45.84	36.42	41.91	0.93
2–3	18.84	38.79	29.25	32.82	0.64
3–4	13.82	26.28	20.35	27.18	1.33
4–5	11.06	21.02	16.28	19.79	0.75
5–6	8.30	18.02	13.32	14.98	0.40

* Camargo, O., and Preston, G. H.; What happens to patients who are hospitalized for the first time when over 65 years of age, *Am. J. Psychiat.* **102:** 168–173 (Sept.) 1945 (Table 5, p. 171).

† Comparison is between columns three [3] and four [4].

Diabetes mellitus

Survival rates were computed for residents of the Home with diabetes mellitus (Tables 97 and 100, Part IV). No data were found with which these five-year and ten-year survival rates could be compared.

Comparison of Psychiatric Mortality with that in Published Reports

Survivorship was determined for the former residents of the Home who were sent to mental institutions during the total period of the study, 1935–1951. Thus, it was noted that 50 per cent of the males and 67 per cent of the females survived the first year of life in a mental institution (combined experience, 59 per cent); 26 per cent of the males and 46 per cent of the females (combined experience, 36 per cent) survived through the second year; 19 per cent of the males and 39 per cent of the females survived three years (combined experience, 29 per cent); 14 per cent of the males and 26 per cent of the females survived four years (combined experience, 20 per cent); 11 per cent of the males and 21 per cent of the females survived five years (combined experience, 16 per cent); and, 8 per cent of the males and 18 per cent of the females survived six years (combined experience, 13 per cent) (Tables 112–114, Part IV).

Comparisons were made with the survivorship noted by Camargo and Preston (109)[1] who followed 239 patients, 65 years of age and over, residing in the state mental institutions of Maryland, where the proportions surviving through the successive years from the first to the sixth were 53, 42, 33, 27, 20 and 15 per cent, respectively (Tables 115 and 140, Part IV).

Since the data of Camargo and Preston were not listed by sex, comparisons had to be made between the combined experiences of both sexes. No significant differences were noted between the rates found by Camargo and Preston and those calculated for the former residents of the Home, when comparisons were made for each year of follow-up over a six-year interval (Tables 115 and 140).

(*To be continued*)

SIGNS OF SEXUAL ABERRATION IN OLD MEN

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The purpose of this article is twofold: 1) to describe the symptoms indicating that old men may be sexual psychopaths, and differentiate as clearly as possible the dangerous from the non-dangerous, and 2) to describe the treatment of those cases diagnosed as potentially dangerous.

The authorities upon which this article is based are the case histories I have seen in Mental Hygiene Clinics, and anecdotes related by prostitutes sentenced to Reformatories who told me many weird stories of the sexual aberrations of their old male customers (1). These authorities also include references to the current literature.

Whatever the definition of psychopathic personality may be, it by no means follows that all psychopathic personalities have sexual urges that endanger society. This applies to the old man as well as to the young one. However, even though the frequency of dangerous senile psychopathic personalities may be exaggerated, they occur often enough to warrant careful study. They may be simply a public nuisance, or they may actually endanger the life of a child.

As a man with simple senile dementia grows older the time comes when he takes little notice of his surroundings. He will urinate where and when he wishes, unless carefully supervised. This means exposure of his genitals, which the uninformed layman may interpret as deliberate indecent exposure, when as a matter of fact the old man had no sexual thoughts of any kind. His action had been a nuisance only. Such a case should be carefully studied by a trained psychiatrist and if the patient be found not so far deteriorated as to render treatment hopeless, he should be placed in a mental hospital where appropriate therapy may bring about a return to an approximately normal life as described in a recent article in this journal (2).

Innocent fondling and petting of children by old men is often misinterpreted as an attempt to seduce them. Old men can love children with no aberrant sexual thoughts. On the other hand, there are old men with mental faculties still alert, who deliberately plan to lead a child away to some secret spot where it can be outraged, and then killed to prevent its telling the story. Although this does not often happen it should be remembered that old men as well as young may be "sex fiends." The proper treatment of these old men is to lock them up in prison or a mental institution. The prevention of such a catastrophe consists in the exercise of common sense on the part of the legal guardians of the children. Every mother should know of the potential danger of allowing her children to be out of her sight with perfect strangers. The simple fact that the stranger is old is no guarantee of safety. The police should also be on the watch

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for sexually aberrant persons. How may they recognize the symptoms? This question has been asked and an attempt has been made to answer it in a brochure published by the National Association for Mental Health (3). In the first place the policeman should know his beat so well that every stranger comes under his surveillance. The hobo type requires careful watching. Wherever there is a fire the policeman should observe the actions of the spectators. There are pyromaniacs among old men as well as young. True pyromaniacs set fires to buildings not simply to collect the insurance but for the orgiastic pleasure they derive from watching the fire. They should not be confused with simple arsonists. Sometimes they stay on the outskirts of the crowd and secretly masturbate while watching the fire. Such persons should be immediately picked up by the police and taken to the nearest facility for a psychiatric examination.

There is another variety of sexually aberrant old men, who get pleasure from surreptitiously cutting the clothes of women while leaning against them. Such an example was brought to my personal attention over forty years ago when my young wife and I were riding on a 125th-Street crosstown trolley car so crowded that we both had to stand up and hold to the straps. It was in the days when long black skirts were in style. I noticed an elderly man—also a strap-hanger—gazing at my wife's petticoat and then suddenly lurching against her. As he did this he heaved a deep sigh as he begged her pardon. This was graciously granted, and no more was thought about it until we got home and my wife discovered that her new long black petticoat was slit in the rear from waist band to hem by a clean cut. This had been so skillfully and silently accomplished that she had felt nothing. Only then did we realize that she had been one of the numerous victims of the "skirt slasher" the police had vainly tried to find for several weeks. After a few more days no further skirt slashings were reported. The man disappeared from the New York scene and no one ever knew what became of him.

Other varieties of sexually aberrant old men are found among the "peeping Toms," who are rarely dangerous unless under the influence of alcohol. Their treatment should be varied to suit the special indications. Very seldom are they found to be dangerous sexual psychopaths. Old men playing in the dirt and picking up trash which they conceal and carry to their rooms are probably "fetish worshipers." These are usually not dangerous persons, especially in the old. The young man who is a fetish worshiper is more potentially dangerous than the old one.

SUMMARY AND CONCLUSIONS

The importance of sexual aberrations in old men has been stressed, with illustrations of the differential diagnosis between the harmless and the dangerous male senile sexual aberrant and the appropriate treatment for each. Sexual aberrancy in old men is often suspected when it does not exist, and should often come under the head of a public nuisance rather than a crime. Nevertheless, there are enough sexually dangerous and potentially dangerous senile men to warrant careful study of the signs by which they can be recognized or suspected.

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CARDIAC REHABILITATION IN GERIATRICS*

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The purpose of this paper is to present some findings in a study of a sample group of geriatric patients with heart disease at The Burke Foundation and to describe the in-patient cardiac rehabilitation program which was developed as a result. It is hoped that in some measure it may stimulate interest in the potentialities of such programs in general and particularly in the setting of the convalescent facility (1).

The term rehabilitation in its broadest sense represents the medical profession's acceptance of the fact that its responsibility is for total medical care from the onset of disease or injury to the restoration of the patient to his highest functional level. As the "fourth phase" of medicine, rehabilitation takes its place with prevention, diagnosis and specific treatment in rounding out our concept of comprehensive medical care. The underlying principles are not limited to any particular age group, disease process or therapeutic techniques. Thus, the fundamentals which apply to the older patient with heart disease should be the same as those which apply to the teen-ager with paralytic poliomyelitis. Age and the specific disease process will alter the approach somewhat in the particular detail, but not in the essence (2).

Cardiac rehabilitation might be defined for our purposes as those procedures carried out under medical prescription, recommendation, and supervision which are necessary for the most rapid, effective and lasting reintegration of the patient with heart disease back into the community. The objective is for the patient to function at his maximum capacity physically, mentally, socially and vocationally, and it is implied that to the extent these objectives are achieved, the individual and the community will find satisfaction and benefit.

The process of cardiac rehabilitation should be given consideration as early as possible in the patient's medical course; but it becomes a more formalized and dominant part of the program of medical care following definitive treatment, as the course stabilizes or starts the upswing of convalescence. Following discharge from the hospital, cardiac rehabilitation under the direction of the physician may take place in the home, in association with office or clinic visits. Work classification units (3) and sheltered workshops (4) may play a role in various aspects of cardiac rehabilitation, depending on the patient and his circumstances.

* Presented before the Annual Meeting of the American Geriatrics Society, Chicago, Illinois, May 3 and 4, 1956.

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However, many cardiac patients are physically unable to return directly home and convalescent facilities are more suited to their needs. This period of convalescent care can be made most meaningful and valuable if an organized program of rehabilitation is available.

BACKGROUND OF THIS STUDY

Since we had already established a complete rehabilitation program for patients with neuromuscular skeletal disabilities, we began to consider the possibility of developing a similar definitive organized program for patients with heart disease—a group which constituted a significant percentage of the patients referred to the convalescent service of The Burke Foundation. This institution traditionally has provided convalescent care for male and female adult patients on referral by physicians following illness or injury. Definitive diagnosis and treatment have usually been instituted in a general hospital prior to admission, and the course of the illness is usually in the process of stabilization. The primary criteria for admission are the necessity for continued medical and nursing care and the potentiality for some degree of improvement.

METHOD

In order to determine more clearly the type of services needed for cardiac rehabilitation, the relative case load, and the possible characteristics of the cardiac patients within our group, we decided to analyze our actual case load by reviewing the charts of patients discharged during the previous twelve-month period. This review included cardiac diagnosis, age, associated illness and manifestations. It became apparent from the initial general statistics that the geriatric age group constituted a major portion of our cardiovascular case load, and this had particular application when considering preventive geriatric cardiology of the fifth decade. Therefore we proceeded to analyze in more detail a sample of 50 patients between the ages of 60 and 65 years (our largest age group) and a sample of 25 patients between the ages of 70 and 75 years, as to marital status, sex, occupation, previous living arrangements, associated illness, previous employment status, and discharge problems regarding housing and future occupation.

RESULTS

A. General

1. An analysis of the case load of convalescent patients at The Burke Foundation during the period April 1954 through March 1955 (Table 1) revealed that of the 1,642 general admissions, 620 or 38 per cent were for cardiovascular disease; of these patients, 297 or 48 per cent were age 60 or over. We were struck by the fact that cardiovascular disease per se made up such a large proportion of our admissions and that patients 60 years old and over constituted about 50 per cent of the cases. It was also noted that there was an associated serious illness as a cause for admission in 226 (36 per cent) of the 620 cases of cardiovascular disease.

TABLE 1

Analysis of Case Load of Patients at the Burke Foundation from April 1954 through March 1955

Total admissions in all diagnostic categories	1,642
Total cardiovascular admissions	620
Percentage that cardiovascular admissions constituted of total admissions	38%
Patients aged 60 and over—total cardiovascular admissions	297
Patients aged 60 and over—proportion of cardiovascular admissions to total cardiovascular admissions	48%
Total number of patients in whom cardiovascular disease was the primary reason for admission	395
Percentage that primary cardiovascular disease admissions constituted of total cardiovascular disease admissions	64%
Total number of patients in whom cardiovascular disease was associated with another disease upon admission	225
Percentage that associated cardiovascular disease admissions constituted of total cardiovascular disease admissions	36%

TABLE 2

Analysis of Patients with Cardiovascular Disease in Terms of Manifestation

Total admissions for cardiovascular disease	620
No. of cases of cerebrovascular accident	71
No. of cases of peripheral vascular disease	42
No. of cases of essential hypertension	26
No. of cases of cardiac disease	549
Percentage of patients with cardiovascular disease who had cardiac disease	89%

TABLE 3

Classification of Patients with Cardiac Disease by Etiology

Etiology of Cardiac Disease	No. of Cases	Per Cent
Arteriosclerotic and/or hypertensive	451	82
Rheumatic	83	15
Congenital	10	2
Luetic	5	1
Totals	549	100

2. An analysis of our cases of cardiovascular disease as to manifestation (Table 2) indicated that among the 620 admissions for cardiovascular disorders, cardiac disease was most prevalent, occurring 549 times or in 89 per cent of these cases. There were 71 cases of cerebrovascular accident, 42 cases of peripheral vascular disease and 26 cases of essential hypertension. Thus, involvement of the heart itself was by far the most common problem.

3. An analysis of etiology (Table 3) in our cases of primary cardiac disease showed that arteriosclerotic and/or hypertensive cardiovascular disease was the most common diagnosis, being recorded in 451 cases. Rheumatic heart disease

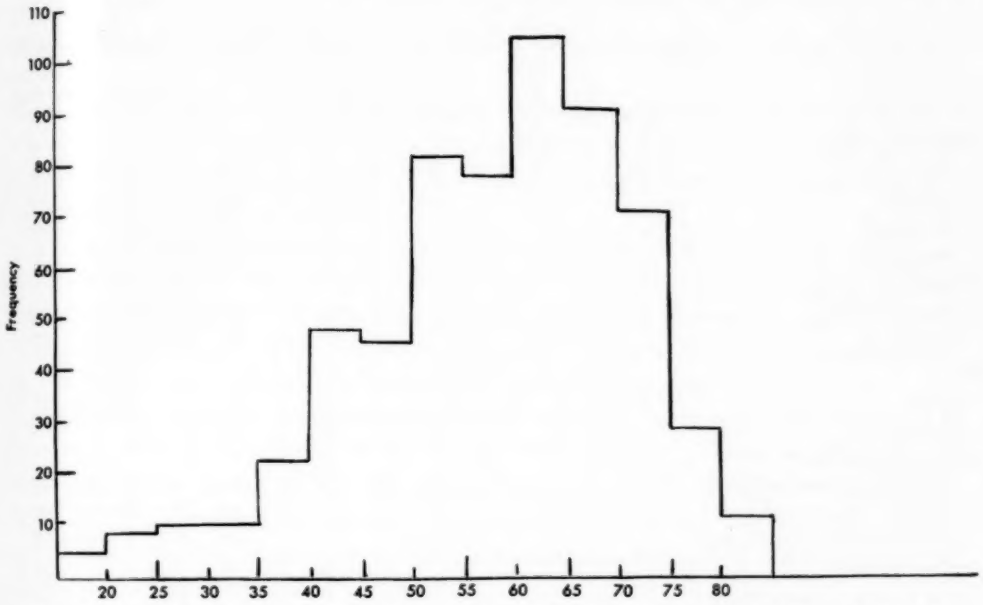

FIG. 1. Age distribution of cardiovascular patients at The Burke Foundation from April 1954 through March 1955.

was next, with 83 cases; congenital heart disease with 10 cases; and luetic heart disease with 5 cases.

4. Analysis of the age distribution of our total admissions with cardiovascular disease (Fig. 1) showed that 48 per cent of the patients were age 60 or over. There were 105 patients aged 60–65 (the largest group); 92 aged 65–70; 82 aged 50–55; 78 aged 55–60; and 71 aged 70–75. It may be noted that at age 50 the incidence of admission because of heart disease almost doubled, reaching the highest point between 60–65 years of age and falling off sharply at 75 years. This age distribution roughly parallels that reported by Paul White in a study of clinical coronary artery disease (5). The marked increase in incidence of clinical cardiovascular disease after age 50 suggests that preventive geriatric cardiology must be applied at a much earlier age than is our present tendency, if we are to think in terms of the results at age 65.

B. Analysis of age group 60–65 years (Table 4)

1. At the time of admission 68 per cent of the patients were not living with a spouse; they were single, widowed or separated. Seventy-four per cent had been married, but now 34 per cent were widowed and 8 per cent separated.

2. There was approximately equal distribution as to sex, although there were more women (56 per cent) than men (44 per cent). Forty-six per cent had children; 54 per cent had no children.

3. With regard to occupation, 68 per cent were considered unskilled or semi-skilled (including housewives), 16 per cent skilled or white-collar, 10 per cent professional or managerial, and 6 per cent unclassified.

4. Living arrangements—60 per cent lived alone, 22 per cent lived with only

TABLE 4

Comparison of a Group of Cardiac Patients Aged 60–65 with a Similar Group Aged 70–75

Status	Age 60–65 Group of 50 Pats.		Age 70–75 (Group of 25 Pats.)	
	Number	Per Cent	Number	Per Cent
Marital status				
Married	16	32	2	8
Single	13	26	9	36
Widowed	17	34	14	56
Separated	4	8	0	0
Parental status				
Had children	23	46	12	48
Childless	27	54	13	52
Sex				
Male	22	44	14	56
Female	28	56	11	44
Occupational level				
Unskilled, semi-skilled	34	68	10	40
Skilled, white-collar	8	16	5	20
Professional, managerial	5	10	4	16
Unclassified	3	6	6	24
Prior living arrangements				
Lived alone	30	60	19	76
With spouse	11	22	1	4
With larger family unit	9	18	5	20
Admission source				
Directly from hospital	40	80	23	92
(first hospitalization)	[28]	[56]	[17]	[68]
(re-hospitalization)	[12]	[24]	[6]	[24]
Directly from home	10	20	2	8
Convalescent status				
First Burke admission	41	82	20	80
Burke re-admission	9	18	5	20
Cardiac status				
Primary	38	76	18	72
Associated with other illness	12	24	7	28
Acute	14	28	7	28
Chronic	36	72	18	72
Prior employment status				
Retired	2	4	10	40
Regularly employed	24	48	5	20
Active housewife	11	22	5	20
Irregularly employed	7	14	0	0
Unemployed	6	12	5	20
Receiving public assistance	3	6	4	16
Finances for convalescence				
Paying own way	28	56	16	64
Payment by third party	22	44	9	36
Patient's status at time of discharge				
Returned to same home	37	74	15	60
Changed living arrangements	10	20	8	32
Re-hospitalized	2	4	0	0
Died	1	2	2	8
Returnedto same employment or household activity	15	30	5	20
Changed employment	14	28	5	20
No definite vocational plans	21	42	15	60

a spouse, and 18 per cent lived with family units of children with or without a spouse.

5. Eighty per cent of the cases came to The Burke Foundation directly from the hospital; among these 40 cases, 28 had been first hospitalizations and 12 had been re-hospitalizations. It was the initial Burke Foundation admission for 41 cases or 82 per cent of the total.

6. Cardiac disease was the primary cause for admission to The Burke Foundation in 76 per cent of the cases, and in 24 per cent there was associated serious illness. Seventy-two per cent of the patients had had cardiac symptoms prior to the present episode so that they were considered chronic cases in comparison with the 28 per cent of cases in which this was the first episode.

7. Of the group, 4 per cent were retired, 48 per cent were regularly employed, 22 per cent were active housewives, 14 per cent were irregularly employed, and 12 per cent were unemployed. We were interested in the relatively high level of full or partial productive capacity despite the fact that 72 per cent had symptoms of known heart disease prior to the present episode. Only 6 per cent of these patients were receiving public assistance.

8. At the time of discharge, 37 patients returned to living conditions which were the same or similar to those from which they had come; 12 patients changed living arrangements because of their medical condition; and 1 patient had expired. Fifteen patients intended to return to the same employment or household activity, and 14 intended to change employment because of medical recommendation.

C. Conclusions regarding age group 60–65.

1. The majority (60 per cent) were not living with a spouse or with children but lived alone; 68 per cent were unskilled or semi-skilled; there was a somewhat higher proportion of women than men (56 per cent female, 44 per cent male); the majority (54 per cent) were childless; only 32 per cent were currently married; and the majority (84 per cent) were productively employed.

2. Although it was the first hospitalization for 56 per cent of the patients, 72 per cent were considered to have had previous symptoms of heart disease. For the majority (82 per cent), it was the first Burke Foundation admission. In 24 per cent of the cases, an associated serious illness was the cause of admission.

D. Comparison of age groups 60–65 years and 70–75 years

As shown in Table 4, in the 70–75 year age group there was: 1) a decrease in the percentage of married persons, and an increase in the widowed; 2) a reversal of male and female percentages; 3) an increase in the percentage of those living alone and a decrease in those living with a spouse; and 4) a marked increase in the number who were retired and unemployed, and a decrease in the number who were regularly employed. No patients were considered irregularly employed. There was an increase of from 3 to 16 per cent in the number receiving public assistance.

Etiologic factors involved in primary and associated cardiac disease in both age groups are shown in Table 5.

TABLE 5

Etiology of the Disease in Cardiac Patients Aged 60–65 Compared with That in a Group Aged 70–75

Etiology and Manifestations	Age 60–65			Age 70–75		
	Number	Per Cent	Incidence	Number	Per Cent	Incidence
Primary Cardiac Disease						
Arteriosclerotic heart disease	16	32		9	36	
Myocardial infarction			10			6
Congestive failure			8			6
Thrombophlebitis			1			1
Anginal syndrome			0			1
Hypertensive cardiovascular disease	6	12		1	4	
Myocardial infarction			2			0
Congestive failure			5			1
Arteriosclerotic and HCV disease	8	16		5	20	
Myocardial infarction			2			1
Congestive failure			3			4
Rheumatic heart disease	6	12		0	0	
Congestive failure			6			0
Surgery	1	2		0	0	
Essential hypertension	2	4		2	8	
Bacterial endocarditis	1	2		0	0	
Sub-totals	40	80		17	68	
Associated Cardiac Disease						
Arteriosclerotic heart disease	6	12		7	28	
Myocardial infarction			0			2
Congestive failure			1			3
Hyperthyroidism			1			0
Thrombophlebitis			1			0
Generalized			3			2
Arteriosclerotic and HCV disease	1	2		0	0	
Congestive failure			1			0
Rheumatic heart disease	1	2		0	0	
Essential hypertension	2	4		1	4	
Sub-totals	10	20		8	32	
Totals	50	100		25	100	
Total myocardial infarctions	14	28		9	36	
Total congestive failures	24	48		14	56	

CARDIAC REHABILITATION PROGRAM

Certain key factors emerged as a result of this investigation, and of the knowledge of the general principles of rehabilitation, previous experience with cardiac patients and intensive individual case studies. These factors, which reflected the needs of the patients, largely influenced the structure and scope of the program which has been developed.

1. Cardiac patients are highly concentrated in convalescent facilities and constitute a large percentage of the total admissions.

2. A large percentage of these cardiac patients are in the older age group.

3. Cardiac problems come into sharp focus after the age of 50, with the highest incidences between the ages of 60 and 65. Since this is prior to the usual retirement age and the financial coverage of social security, vocational and economic problems are important considerations.

4. In this age group the factors of living alone, chronicity of illness, housing and dietary requirements, financial concerns, and lack of family attachments appear to be significant factors causing the emotional and social problems so frequently found.

5. The presence of feelings of anxiety and depression are usually related to realistic problems of later life and illness. Nevertheless, it has been our experience that emotional maladjustment in the geriatric cardiac patient frequently predates the onset of cardiac illness and older age.

6. Relative lack of flexibility, strong environmental pressures and narrowing of interests make for less satisfactory response to standard psychotherapeutic techniques, suggesting the need for more superficial approaches using encouragement, support and environmental manipulation.

7. The characteristic of the geriatric group is not so much the uniqueness of their individual medical problems but rather the high frequency of multiple misfortunes. These include multiplicity of physical ailments, intellectual and emotional malfunction and socio-economic problems.

8. The individual's "self concept" is of essential importance. It is pathological if the patient subjectively considers himself an "old man," when this is unrealistic physiologically; this attitude causes him to function below his actual capacities.

9. Thorough evaluation of the patient in terms of his potentialities and the services required for achieving his potentialities, is the basis of the rehabilitation of older patients with heart disease, as in any other form of rehabilitation. Each patient should be considered on an individual basis, regardless of age, and the program should be tailored to his specific requirements.

10. Maximum self-sufficiency and independence can be obtained only when the patient is motivated towards intelligent and realistic effort on his own behalf. This means that he should be familiar with such things as his limitations, capacities, medical and dietary routines, and the proper precautions to be observed. Questions, doubts and insecurities may call for educational techniques. The patient's self-evaluation of capacity is often most effective when it is based on a controlled, graduated activity program.

General procedure

All patients newly admitted with heart disease undergo screening as to their physical, emotional, social and vocational status. Significant factors may be indicated by the referring agency, the admitting intake worker, the staff nurses and physician, or by the staff conducting the admission orientation meeting to acquaint the patients with the services available to them. Further evaluation

may include, as indicated, a cardiologist's examination, individual social service, and psychologic and vocational studies including vocational testing.

Following these investigations, a staff conference is held; each patient is discussed and the patient's readjustment to illness, self, family, job and community is determined. At this time the cardiologist, on the basis of the group recommendations, prescribes the service programs deemed necessary for the patient's rehabilitation. These may involve group and individual psychological guidance and therapy, social service case work, a program of graduated physical activities (including those of daily living, such as a "cardiac kitchen program"), occupational therapy, work therapy, vocational guidance, prevocational exploration, brush-up and retraining, medical group meetings, dietary group meetings, interviews by representatives of New York State Division of Vocational Rehabilitation, physical-medicine treatments, and speech and hearing services. At this staff conference a tentative goal is set for the patient, in terms of which progress and results of the specialized services can be judged. As the situation warrants, the goal is reset periodically by the cardiologist at re-evaluation meetings.

Medical services

Patients are under the care of a cardiologist who evaluates the cardiac status and sets limitations, work capacity and functional and therapeutic classifications. Progressive intensification of the program of physical activity is under his direction, and strict attention is paid to symptomatology and evidence of fatigue or decompensation. Activities of daily living, occupational therapy and work therapy are regulated on the basis of a prescription indicating intensity, duration and frequency.

Nursing service

The cardiac rehabilitation nurse supervises and controls the patient's activities of daily living, according to the directions of the cardiologist. As new activities are added, the patient is checked by the nurse regarding changes in pulse rate, respiratory rate, blood pressure, general appearance and symptoms of angina, dyspnea or fatigue. Thus, as the patient is permitted to walk a city block, make his bed or climb stairs, his condition is observed and checked by the nurse and a report submitted to the cardiologist. This serves as a safety control, permits adequate prescription of increasing activities and gives patients a sense of reassurance and confidence. They feel encouraged by the combination of permissiveness with careful supervision. This method curbs patients who would increase activity too quickly and prods those who tend to inhibit progressive physical activity. It permits the development of a closer relationship with the medical personnel and greater efficiency, insight and alleviation of the patient's anxiety.

Social service

No understanding of a patient can be obtained without knowledge of the social environment from which he comes and to which he must return. Rehabilita-

tion is concerned with his ultimate level of function in society and with the development of an appropriate discharge plan, so that he will return, if possible, to an environment compatible with his abilities. Thus, a detailed knowledge of his human and physical surroundings is indispensable. Much material is often obtained as to his interpersonal relationships, attitudes, ambitions, and values. The insight provided by these factors into the emotional life of the patient is essential for an understanding of his needs.

The cardiac patient may require assistance with his personal activities of daily living at home, if functional capacity is low. Arrangements for the preparation of meals or special diets, toilet and bathing activities, or even stair climbing may require judicious discharge planning with the social worker. If family, friends or visiting nurses are not available or adequate, discharge plans may include referral to a boarding home, nursing home or chronic disease hospital. In helping the emotional adjustment to illness and disability, the social worker plays an important role in providing for discussion, understanding, interest, encouragement, support, positive recommendation and practical assistance in dealing with environmental problems. By assisting the patient in developing his plans in regard to finances and housing upon discharge, the social worker can relieve much of the situational anxiety which tends to complicate and impede improvement.

Educational service

1. Group medical meetings are held with the cardiologist in order to educate the patients in the general principles of health, to clarify questions regarding symptoms, prognosis, terminology and methods of treatment, and to outline a well balanced program of self care. Discussion of cardiac physiology, and interpretation of certain gastro-intestinal and musculoskeletal symptoms as non-cardiac in origin, is reassuring and reduces anxiety and confusion. However, skill in handling groups is necessary to make this information meaningful and beneficial.

2. Weekly group dietary meetings are conducted for the patients by the chief dietitian, to instruct and answer questions in regard to the preparation of their diets, choice of foods, principles of nutrition, cardiac diets, use of substitute foods, and the location of stores or restaurants where specialized foods can be obtained. The primary objective is to clarify misconceptions and provide a sound realistic basis for meeting their own dietary needs.

Physical medicine

Physical medicine has been found to be of value in treating the pain and discomfort of neuro-musculo-skeletal conditions which are often present in the geriatric cardiac patient. Rheumatic disorders, the shoulder-hand syndrome of postmyocardial infarction, or the painful shoulder syndrome of postcardiac surgery can be treated with benefit in terms of improvement in symptomatology and function. Identification of chest pains as being musculo-skeletal rather than cardiac in origin prevents unnecessary incapacity due to the erroneous impression that all symptoms are cardiac if the patient has heart disease.

Activity program

This includes all aspects of progressive physical activities which are prescribed by the cardiologist. The activities are provided by various departments.

A. Occupational therapy: Qualified therapists provide graded activity in arts and crafts, more advanced artistic activity such as oil painting and ceramics, functional activity for strength and range of motion in shoulder syndromes, prevocational testing, and training in a "cardiac kitchen program." As in the Work Therapy and Personal Adjustment Services, the aims are redevelopment of work tolerance, desirable work habits, interest, and self confidence. The cardiac kitchen program is aimed at teaching appropriate techniques for saving time and energy to the housewife or the person who lives alone. It provides an opportunity for the patient to try out his functional capacity in tasks to which he must return.

B. Activities of daily living: This program involves the systematic performance of self-care activities, with gradually increasing demands on energy, under the supervision of a nurse who is specially trained and oriented to observe signs or symptoms of excessive strain. Under more doubtful circumstances, the physician observes the patient's performance, and keeps a careful record.

C. Vocational services:

1. Work Therapy: This program offers patients the opportunity to observe their physical response to work, and to judge their capacity, interest, skill or aptitude in various productive work situations, such as office practice (typing, filing, shorthand, mimeograph or switchboard), elevator operation, graphic arts, carpentry, electrical and electronic trades, jewelry and photography. The patient under supervision gradually increases the frequency and duration of his work, approaching the demands of outside employment. Actually four to five hours of work is about the maximum that can be achieved, because of the time required for rest and other services. This is adequate tolerance. We generally advise patients to return to work on a part-time basis, if possible, and then achieve full time gradually. Consideration is given to the time and energy required for transportation from the home to the place of business, as this is often more taxing than the job itself.

2. Vocational Exploration: Essentially the same activities are used as in work therapy, but they are new to the patient. In conjunction with vocational and intelligence testing, interviews with the vocational counselor and pre-vocational testing in occupational therapy, the patient is helped to select a suitable occupation when a change of employment is indicated. Various equipment and job samples are provided for trial. The emphasis is not on the finished product but on appraisal.

3. Vocational Training: This is carried on to a limited extent when time permits. It may involve refresher training, or it may add a skill to one already learned—for example, typing in addition to switchboard operating. In some instances it provides initial training adequate for employment; in others the patient is referred to the State Division of Vocational Rehabilitation for additional training in a trade school.

4. Personal Adjustment Program: This is a continuation of the foregoing

activities but is aimed primarily at improving the patient's emotional adjustment and efficiency in a work setting. The psychologist, vocational counselor, work therapist and occupational therapist coordinate their efforts to develop motivation and interest, instill desirable work habits, and increase the patient's qualifications for employment.

Vocational counseling service

The vocational counselor plays a major role in determining the prospects of returning the patient to gainful employment. This is carried out on the basis of the medical determination of physical capacity, the social and psychological factors, and the results of the vocational evaluation itself. Vocational counseling assists the patient to work out plans for further training, job placement, or return to the original employment in the same or adjusted capacity. It has been found that, whenever possible, return to the original employment under modified circumstances is preferable to seeking an entirely different vocation. This is particularly true for the older worker who has acquired considerable experience and seniority.

Psychological service

In order to evaluate the patient and determine his needs, the physician often turns to the clinical psychologist to provide definitive information concerning the patient's intellectual and emotional status. The more positive the action to be taken in achieving rehabilitation, the more necessary it is to understand the attitudes, feelings and psychodynamics of the patient, in order to preclude errors.

Individual and group evaluation, guidance and psychotherapy are available for patients who manifest a marked degree of anxiety or depression, either as a reaction to the cardiac condition or as part of a premorbid method of behavior and emotional response. Since this is a short-term procedure, the benefits lie in assisting the patient who is at or near the breaking-point in regaining sufficient "emotional control" to make necessary adjustments and return to an active life. When more intensive psychotherapy and family agency service are indicated, appropriate referral is made at the time of discharge. Often the patient is aided by removal from an anxiety-producing environment, for the purpose of re-evaluating his situation and making constructive decisions which will improve his lot. This may be beneficial, even when the patient returns to the original situation, as long as he has become better able to cope with his problems.

SUMMARY

1. A functioning, definitive, in-patient program of cardiac rehabilitation is described, together with the purpose and functions of the component services.

2. An analysis is presented of the case load of patients with cardiovascular disease admitted at The Burke Foundation from April 1954 through March 1955. The results of this study indicate the important place occupied by the geriatric age group in cardiac rehabilitation problems.

3. Data collected on a sample of older patients served as a guide to develop-

ment of the specialized services required for the appraisal and management of geriatric patients in a cardiac rehabilitation program.

4. Although vocational rehabilitation is often not a feasible goal for the geriatric patient, this decision should not be made automatically, but determined by evaluation in the individual case. When possible, every effort should be made to achieve vocational rehabilitation.

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INTERESTING FACTS ABOUT FEET*

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Chiropody is defined as the care of the feet in health as well as in disease. The human foot is to a great extent an unexplored area in medicine. One can search through the leading systems of orthopedics, surgery, pediatrics, obstetrics and gynecology and find no reference to the foot as an entity. There is no reference to diseases of the foot in the aged, nor to the prevention of the ills which emanate from foot disorders. The medical student receives full training in the anatomy of the foot, and its relation to the function of the body generally, but little emphasis is placed on the dynamics of the foot, its relation to general diseases of the body, and the capacity for developing its own diseases and disorders.

In the aged a vast amount of suffering is caused by bad feet as a result of disabilities which could presumably have been corrected in earlier life. In later years, peripheral vascular diseases, arteriosclerosis, diabetes and other ailments produce lesions in the feet which can be serious.

A report made in Great Britain by representatives of the "Society of Medical Officers of Health" says that some 80 per cent of old people need the services of a chiropodist.

An interesting series of findings and recommendations is to be found in the report of "The Committees on Medical Auxiliaries" made to His Majesty by the Minister of Health for Great Britain. In this publication, which is known as the Cope Report, the following statement is made: "Representatives of the British Orthopaedic Association told us that chiropody should be available for the treatment of both in-patients and out-patients referred by the hospital medical authorities." The conclusions of the Report were: (a) There is evidence to support the view that there should be a chiropodist available in every general hospital. Where departments exist for the treatment of diabetic, orthopedic, dermatological and rheumatic patients, the services of chiropodists are particularly required. (b) If there is an extension in geriatric work, as seems likely, there will be undoubtedly an increase in the demand for the services of chiropodists in connection with these units.

In this country, Dr. Charles A. Mayo has said: "I am convinced that doctors of medicine, myself included, have paid too little attention to the feet in their relationship to the condition of a patient, and have made too hasty an examination of the feet, considering their potentiality as a source of comfort or discomfort." There has been a chiropodist on the staff of Mayo Clinic for years.

Dr. Elliott Joslin, the noted authority on diabetes, employs several chiropodists in his large clinic in Boston. Chiropodists are on the staffs of forty hospitals

* Presented at a scientific staff meeting at the Montefiore Home, April 1956.

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in New York State alone, and in about a thousand throughout the country. As most of you know, our services are now being used in Cleveland at City, Mount Sinai, and Highland View Hospitals.

Foot disorders do not begin at the time of the onset of symptoms. Their appearance indicates the breakdown of a structure which has long been functioning at a mechanical disadvantage, and is the culmination of years of use under adverse conditions which had their inception in early life. It is consistently reported that functional foot disorders do not exist among races which do not wear shoes, whereas their prevalence among the so-called civilized peoples is well known. Civilization has imposed upon workers long hours of labor in the standing position, with little relief from weight bearing; has replaced resilient earth with pavements and hard floors; and has encased the feet in footwear which too often is poorly designed and incorrectly fitted.

An understanding of the normal anatomy and physiology of the human foot as it is today can best be reached through an insight into its evolutionary background. The present-day human foot represents the sum of innumerable changes in form and structure which have taken place during its evolutionary history. During all the centuries of its development, the foot has changed its architecture and function to meet the demands placed upon it, as locomotion became more and more extensive and complicated.

EVOLUTIONARY DEVELOPMENT OF THE HUMAN FOOT

1. Arboreal life as applied to the foot. Primate life began in the trees. Our ancestors being of arboreal stock, the foot was used for grasping purposes. The type of foot best adapted to such use was one in which the fore, or grasping part of the foot was highly developed, flexible and strong. The heel, which rested lightly on the supporting branch was unimportant, little used, and rudimentary. The arboreal foot, then, is characterized by long, flexible phalanges or toes and metatarsal bones, a small medially projecting hallux resembling a thumb in form and action, and a rudimentary heel which does not touch the ground.

2. Terrestrial life as applied to the foot. The demands of terrestrial life were quite different from those of arboreal life and these changed demands produced certain characteristics of development, which may be summarized as follows:

The foot became plantigrade through development of the heel to meet the needs of the upright position, and became more compact in order to sustain the burden placed upon it by this position. It underwent changes in the form and arrangement of its individual bones to meet the demands of leverage involved in efficient locomotion. Future changes in our mode of living will undoubtedly result in further evolutionary changes in foot structure.

ANATOMY

Discussion of the anatomy of the foot is a prelude to an understanding of foot disorders, which are usually based on some distortion of variation of the foot's normal anatomic arrangement or functions.

It has been reliably estimated that disorders of the foot occur in 80 per cent of women and 60 per cent of men. This is not surprising when one takes into consideration the fact that in no other place in the body is there such an interlacing of bones, muscles, tendons, ligaments, fascia, nerves, blood and lymphatic vessels as in the hands and feet; that about one third of the movable joints in the body are in the feet; and that exactly one fourth or 25 per cent of all the bones in the body are below the ankles.

The foot contains 26 bones—7 tarsal, 5 metatarsal, and 14 phalangeal or toe bones. Since strength is necessary in an organ which must support the entire weight of the body, the bones of the foot are bound together by strong and numerous ligaments. The 7 tarsal and 5 metatarsal bones, are arranged to form structural devices known as arches. The arch has two advantages: 1) it is mechanically strong, and 2) it is resilient, and thus is able to absorb shock and to impart elasticity in action.

For practical purposes the foot is considered to have a longitudinal arch (which extends from the heel forward to the heads of the metatarsal bones) and a transverse metatarsal arch which extends across the front of the foot from the head of the first metatarsal to the head of the fifth metatarsal.

It should be emphasized that the weight-bearing function of the foot is carried out along a triangular pathway, *i.e.*, the weight of the body strikes the under surface of the foot at the heel, is carried forward to the base of the fifth toe and across to the base of the first toe.

The muscles of the foot and leg are important in the performance of three necessary functions: 1) that of carrying out the foot movements required for locomotion, 2) that of maintaining the leg in a balanced position over the foot, and 3) that of serving as supports to the arches of the foot.

The long muscles of the leg, insofar as they impart movement to the foot, may be divided into four groups—extensors, flexors, adductors, and abductors. The extensors (which extend the foot on the plane of the leg and lift the heel) are the soleus, gastrocnemius, flexor longus digitorum and flexor longus hallucis. The flexors (which raise the foot from the ground) are the tibialis anticus, peroneus tertius, extensor longus digitorum and extensor longus hallucis. The adductors (which draw the foot into inversion) are the tibialis posticus and tibialis anticus. The abductors (which turn the foot outward) are the peroneus longus, peroneus brevis and peroneus tertius. It is largely through the action of the long muscles that the various movements of extension, flexion, adduction, abduction and rotation are carried out in the foot.

FUNCTIONS

Broadly speaking, the functions of the human foot are: 1) to provide support for the weight of the body, 2) to provide a lever for raising the body and propelling it into motion, and 3) to act as a shock absorber for the body.

The principal movements of the foot—extension, flexion, adduction and abduction—are carried out at the ankle joint.

As in various other parts of the body, there is a certain range of motion for

proper functioning. For the normal range of motion the foot should extend to an angle of 140 degrees on the plane of the leg, flex to an angle of 75 degrees, adduct to an angle of 30 to 35 degrees, and abduct to an angle of 15 to 20 degrees. Any limitation of these motions interferes with proper functioning of the foot, causing an imbalance of body weight which may result in painful areas and numerous excrescences common to the foot. To repeat—the functions of the human foot are support, leverage, and absorption of shock. In order that each of these may be performed, it is necessary to have a normal arrangement of the bony articular structure combined with a properly balanced muscular structure. With such a combination the foot and leg are in balance and body weight will be evenly distributed over the foot.

SOME DISORDERS OF THE FOOT

The simple heloma or hard corn, which is probably the most common foot ailment, can easily become an orthopedic problem. In this condition, the toe has been subjected to abnormal pressure and friction, due to an ill-fitting shoe or an incorrect way of walking. Hyperemia and excessive cellular proliferation result in a hardened mass of tissue; this presses on the nerve terminals, causing pain. The patient favors the painful area and walks in an unnatural way; this, in turn, can lead to pains in the leg and discomfort in the lumbar region. Contrary to popular opinion, a corn does not have roots; it is a mass of dead epithelial cells. So long as the cause persists, a corn is likely to recur after removal.

The plantar tyloma or callus is caused by standing long hours on a hard surface, by the use of thin-soled shoes which afford little or no protection or support, and possibly by mechanical weakness of the arch.

Hallux valgus or bunion is a common foot abnormality and is due, without question, to ill-fitting shoes—usually short ones. Because of the wearing of short, pointed-toe shoes, the distal phalanx is forced into a position of abduction (turning away from a straight line), resulting in a misalignment of the entire fore-foot.

Papilloma or verucca is a cauliflower-like growth, usually found on the plantar surface of the foot. It is quite common among school-age children. It is a benign skin tumor and can easily be cured.

A frequent complaint is that of abnormal, horny toenails, due to injury. Nails should be cut fairly straight across.

Various weaknesses of the arches, termed "weak foot conditions," are very common. They are the result of such factors as improperly balanced body weight, occupational stresses, improper shoes and general debility. Beneficial results may be obtained by the use of exercises, physiotherapy, strappings, mechanical foot appliances, and other kinds of corrective devices built into the shoe or applied to the outer sole.

SHOES

The proper shoe for the adult woman is an oxford of the nurse's type, with a five- or six-eyelet lace, a cuban heel, and the pattern cut as high on the side

of the foot as possible. Choice of material rests between kid or calfskin leather. A shoe made of calfskin will be sturdier and more durable, but some may find kidskin more comfortable because of the softness and flexibility of the leather. The welt or stitched-on sole of oxford-type shoes is always best, as it affords more support and protection than the thin sole of dress-type shoes. Preferably, the heel should be made of leather, and should be 1.0–1.5 inches in height.

CARE OF THE FEET

Foot care for the aged must necessarily be of a prophylactic nature. Warm foot baths should be a daily routine, and frequent change of hose is wise. Any skin lesion, no matter how minor, should be treated antiseptically and a protective dressing applied. The use of a cream or ointment, such as lanolin, is excellent for the dry, scaly skin commonly observed among the aged. Self-treatment should not be allowed at any time, and the use of sharp instruments, such as razor blades, should not be permitted.

The chiropodist, in treating the feet of persons in any age group, should be acquainted with the signs and symptoms of impaired circulation, as manifested in changes in temperature, sensation and color.

An analogy might be drawn between the foundation of our body—the feet—and the foundation of a house. When the foundation of a house is crooked or out of line the entire structure is affected. Regardless of the cause, when our feet are painful or sore they affect our physical comfort and peace of mind. When one considers the hundreds of steps that are taken in the performance of our daily duties and the stresses and strains that our feet are subjected to, one realizes what a remarkable structure nature has given us. Surely our feet are deserving of more care than they usually receive.

HOST-TUMOR ANTAGONISM. III. PROLONGED SURVIVAL OF CERTAIN PATIENTS WITH CANCER. FORTUITOUS OCCURRENCE OR IMMUNITY MECHANISM?

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It is now generally recognized that there are many individual instances of prolonged survival of cancer patients. In addition, there are a smaller number of authenticated cases of spontaneous regression of established cancers. The unusual behavior of carcinoma *in situ*, the temporary control of acute leukemia by the folic-acid antagonists, and the partial regression of mammary and prostatic carcinoma during hormonal therapy are now definitely established. These facts make it unlikely that cancer can be considered as a completely autonomous, progressive and irreversible new growth. Recent work by the Grahams suggests that some patients with cancer elaborate the antibodies corresponding to their tumor (1), especially in instances of favorable lesions that respond satisfactorily to treatment.

On the other hand, Jones (2) suggests the alarming possibility that survival in patients with cancer is actually shorter with treatment. Unfortunately, we do not yet know all the determinants in cancer, but obviously the problem is vastly more complicated than the statement, "Early cancer can be cured."

"SPONTANEOUS REGRESSION"

There can be no "spontaneous" regression in the real sense of the word. Every situation in biology has a cause, although we may not know what it is at the time, and therefore it may seem "spontaneous" to us. The fact that such a regression may actually occur, implies that there is a mechanism in existence for its accomplishment. The phenomenon of complete regression is exceedingly rare, being observed not more than once in every 100,000 patients. Fluctuations in the growth rate of the tumor are much more common; indeed they probably occur in every patient.

The cases of "spontaneous" regression of human malignant neoplasms observed in the latter part of the nineteenth century and the early part of the twentieth century have been systematically reviewed by Rohdenberg (3). He analyzed the events associated with the regression in these patients.

Rohdenberg stated that examination of the tumor in many of the recorded cases of spontaneous regression showed necrosis followed by calcification. Degeneration or infection had occurred; the affected cells had died and were removed by the same mechanism as in non-malignant tissue; the defect had been repaired by the formation of granulation tissue. In other cases, degeneration or infection had not initiated the process, but fibrosis had occurred and had resulted in complete absorption of the neoplasm.

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The greatest number of spontaneous regressions of malignant growths were observed following incomplete surgical removal of the tumor, a smaller number during a severe febrile condition, and least often following a profound alteration in the metabolic state of the organism, such as in extreme cachexia, the artificial menopause or the puerperium.

In those patients in whom spontaneous regression occurred after incomplete surgical operation, the operation sometimes was only a simple laparotomy or biopsy of the tumor. In many instances these procedures were followed by fever which lasted for several days. In some patients, the entire tumor could not be removed, even though a large portion of the malignant tissue was excised. Rohdenberg entertained the possibility that the entire tumor may have actually been removed, and pericancerous inflammatory tissue may have been left, which later spontaneously subsided. Another possibility is that the blood supply of the remaining portion of malignant tissue was compromised during the operation, and thus the remaining tissue became necrotic and was later absorbed.

Some of the tumors were inoperable, especially in cases of uterine carcinoma. Treatment consisted of curettage and cauterization. This operation was usually repeated several times. The deterrent effect of heat on malignant cells was a possibility under such circumstances. It has been shown experimentally that relatively low degrees of heat applied to animal tumors before inoculation retard the growth of these tumors.

An appreciable number of spontaneous regressions occurred after acute infections. The infection was usually erysipelas, but in a few instances it was smallpox, malaria or acute tuberculosis. Clinically, the important event seems to have been a continuous fever of 104° to 105°F. for three or more days.

Regressions during profound alterations in metabolism were difficult to explain. It is known, however, that animals in a low state of nutrition are poor subjects for tumor inoculation, since the transplant proliferates very slowly and often recedes. Regression of a tumor in humans has often occurred during cachexia. Rohdenberg differentiates the state of cachexia from emaciation due to starvation.

Several cases arose during pregnancy and regressed during the puerperal period. In 2 women this order of events recurred in three successive pregnancies.

In a few patients regression of a malignant tumor followed spontaneous absorption of a transudate. There were several recorded instances of spontaneous regression of chorionepithelioma. Rohdenberg speculated that the regressions in these instances were probably due to antibodies, such as cytolysins. Antibodies are possible in this condition, because the tumor cells are not strictly autologous as in ordinary tumors, since half of the cells are derived from the male.

Rohdenberg (3) reported his own study of 3 cases of spontaneous regression. The first patient had lymphosarcoma, which temporarily regressed following antisyphilitic treatment with arsphenamine. The second patient had an epithelioma in the region of the eye. A small section of the tumor was removed for diagnosis. Seven days after the operation, the tumor began to recede and in two weeks it had entirely disappeared. This patient died five weeks later of pneumonia, and at autopsy it was found that the operation had resulted in obliteration of the

blood supply of the tumor. The third patient was extremely interesting. A 57-year-old female had a spindle-cell sarcoma in the left pelvic area. A biopsy was carried out, but the mass could not be resected. Following the operation, sciatic neuritis developed on the opposite side. Treatment consisted of baking over the entire body, and the patient improved slowly. She died three years later of uremia, and at autopsy no evidence of the sarcoma was found. Including his own 3 cases, Rohdenberg found 302 cases of spontaneous regression of malignant neoplasms; however, the evidence of malignancy was not incontrovertible in each instance. In several patients, there was arrest of the primary lesion, but spread of the metastases. In several patients, the reverse was true.

Stewart (4) mentions several cases of spontaneous regression. The first patient had a uterine myosarcoma which spread throughout the pelvis and in the mesentery. The tumor was soft, vascular and wholly inoperable. The patient was treated with a radium bomb, but did not show any evidence of radiosensitivity. Suddenly a high fever, an urticarial rash and marked eosinophilia developed. Within a few days, much of the tumor and the ascitic fluid had disappeared. The tumor then disappeared completely, and ten years later the patient was entirely well. Five years after the initial therapy, she again received a small amount of radium for treatment of a lesion of the cervix, and again responded with a febrile, hypersensitive reaction. Stewart believed that some alteration may have occurred in the tumor protein, so that the patient became sensitive to her own protein. This in turn, probably evoked an intense immunologic reaction.

Another patient was an infant of a few months of age with a neuroblastoma spread in multiple subcutaneous metastatic nodules. A radium plaque was applied to one or two of the nodules to determine radiosensitivity of the lesion; the nodules were radioresistant. A small test dose of Coley's toxin was given, but not enough to be considered as treatment. Then the nodule began to disappear. More than five years later, the child was perfectly healthy.

Another infant with neuroblastoma presented a destructive metastasis in the upper end of the left femur. X-ray therapy in adequate dosage was applied to the femur. At the age of 14 years the child showed no trace of the tumor. Stewart felt that the primary tumor must have come under the control of the host by spontaneous maturation. Cushing and Wolbach (5), years before, had described the transformation of a malignant paravertebral sympathicoblastoma into a benign ganglioneuroma.

Stewart mentioned recovery of a patient with leukemia, in whom the diagnosis had been made more than ten years previously by a well-known hematologist. This patient was admitted to the hospital more than ten years later for Hodgkin's disease, but there was no trace of leukemia at that time.

A nurse underwent laparotomy and was found to have an inoperable hepatoma. She remained in good health and at work for twelve years. Subsequently, she met an accidental death. At autopsy, all that remained of the hepatoma was a small, shrunken fibrotic lesion in the liver.

A man had an amputation through the lower part of the finger for reticulum-cell sarcoma of bone. The disease recurred locally, and metastasized to the skin of the abdominal wall. He was given Coley's toxin with remarkable result. He

was well, thirty years after the amputation. Stewart felt that a combination took place between Coley's toxin and tumor protein, which made the tumor tissue antigenic.

Spontaneous disappearance of multiple pulmonary metastases from hypernephroma are rare, but several cases have been reported.

Bumpus (6) described a patient, aged 50, whose preoperative x-ray film of the chest showed nothing abnormal. However, fifteen months after nephrectomy for hypernephroma, the patient had cough with bloody sputum and x-ray evidence of pulmonary metastases. Five months after onset, the cough and pulmonary metastases disappeared spontaneously. On re-examination three years later, the lungs were found to be clear. Beer (7) mentions an exactly similar case after nephrectomy for hypernephroma; five months after onset the symptoms disappeared, and the lungs were found to be normal.

Mann (8) presented a patient who had a pulmonary metastasis at the time of operation for hypernephroma. Seven weeks later, large and more extensive pulmonary metastases were visible on x-ray examination. Eighteen months after the operation the patient had gained weight and his cough and hemoptysis had disappeared. A chest roentgenogram showed that the nodules had also disappeared. Three years after the operation, the patient was in good health and the chest was still normal on x-ray examination.

Fergeson and Black's (9) recent case of complete regression of carcinoma of the colon is extremely interesting. A tender fluctuant mass in the left flank of a 45-year-old patient was drained in 1950 and again in 1951. In 1951, colonic obstruction developed, which necessitated the establishment of a colonic stoma. At laparotomy, a hard nodular mass involved the lower portion of the descending colon. The mass was solidly fixed to the bony pelvis and was considered inoperable. On subsequent admission to the Mayo Clinic, it was noted that the patient had a colonic stoma in the right upper quadrant of the abdomen, and above the left crest of the ileum there were two draining sinuses. A tender, hard, ill-defined mass was present in the abdomen just medial to the left anterior superior iliac spine. The sinuses were curetted and masses of tissue were removed that proved to be carcinomatous on histologic examination. The lesion was considered to be inoperable. It was treated by application of x-rays through anterior-posterior and lateral fields. A total dose of 3000 r was administered. The patient was sent home in November 1951. He returned to the clinic in September 1953, requesting closure of the stoma. The sinuses had healed during December 1951. He was clinically well, and the mass in the left lower quadrant had disappeared. The two blind ends of the colon were mobilized, and excised for examination. No tumor tissue was found. A side-to-side colocolostomy was performed, and the patient recovered. The authors considered it unlikely that the small amount of radiation therapy could have caused the disappearance of the cancer. The original diagnosis was grade 1 adenocarcinoma, and these less anaplastic carcinomas are considered relatively radioresistant. They felt that the complete disappearance of the colonic segments and the mesocolon could only be explained by infarction of these structures and subsequent absorption.

An instructive case report is that of Allen (10), concerning a 38-year-old

woman with a melanoma which was at first thought to be non-malignant on histologic section. Two months later a black area appeared in the scar, which was widely excised and reported as a malignant melanoma. She was given x-ray therapy over this area. She was next seen when she had widespread multiple bluish nodules over many areas of her body; in addition, she was ten weeks pregnant. One of the nodules was removed; histologic examination showed the tumor to be more cellular and less differentiated. Fourteen days post partum, further lesions developed in additional areas. Within eleven weeks post partum, all the nodules had disappeared. When last seen, twelve years after the initial operation, the patient was entirely well. Allen felt that, in this patient, the metastases arose as a direct result of the stimulus of pregnancy, and became so dependent on this metabolic state that, when the stimulus disappeared, the metastases did also.

PROLONGED SURVIVAL

Much more numerous than cases of spontaneous regression are those in which cancer has been compatible with an unusually long survival rate. It has long been known that in any large series of untreated cancer patients, some of the tumors will manifest cyclical growth, *i.e.*, periods of rapid growth alternating with stationary periods and periods of actual regression. Delayed recurrences are often noted; for instance, cancer may appear years later in a surgical scar. The quiescent period may last for years. Occasionally metastases will remain dormant in lymph nodes or other vital structures for years without producing clinical symptoms.

There is as yet no completely satisfactory explanation of these instances of prolonged survival, except possibly the phenomenon of host resistance, either general or local. There must be a wide variation in individual resistance to malignant growths. Otherwise we should have to assume a constantly changing growth energy of tumors, which is a less likely possibility.

Morton and Morton (11) reported a series of cases in which cancer had a chronic course. These cases were unusual in that the patients had markedly prolonged periods of active, useful existence even though the neoplasm could not be completely eradicated by surgery or radiation therapy. Since some of the patients lived for more than twenty-five years after diagnosis, they could certainly be said to be suffering from a chronic disease.

These authors describe a patient who died following a carotid-sinus operation. At autopsy, there was carcinoma of the thyroid with widespread metastases to the lung, liver and spleen. Twenty-six years previously, the patient had been operated on for carcinoma of the thyroid, but he had no clinical evidence of any malignant disease at the time of his death. Microscopic examination of the thyroid tissue showed dense collagenous fibers in which there were wildly-growing nests of cells. Microscopic section of the lung tissue showed an area of fibrosis which contained a nest of malignant cells. Microscopic sections of the liver and spleen showed metastatic thyroid nodules.

A woman was operated on for carcinoma of the thyroid. A metastatic tumor

in the shaft of the left femur was operated on thirteen years later. She survived in good health for twelve years after a second operation, and then widespread metastases developed, which proved fatal.

Another patient had had a hypernephroma of the right kidney removed sixteen years before a metastasis was noted in the right femur. The hip joint was amputated. The patient was still clinically well eight years after the second operation, at the time of reporting.

A 40-year-old woman had a radical mastectomy for carcinoma in 1918. Twelve years later she apparently had a local recurrence. Thirty-one years after the original operation, biopsy of a nodule in the left axilla showed metastasis. Thirty-two years after the first operation she died with metastatic carcinoma of the liver.

Another patient with a carcinoma of the breast had a local recurrence three years following operation. Thereafter a symptom-free period was noted for approximately sixteen years, after which widespread metastases occurred and caused her death.

Another woman had had a nevus (probably malignant) removed in 1939. She had also had axillary lymph nodes removed later in 1939; these showed metastatic melanoma. During the next six months, she had six operations for metastatic disease. The next year infection developed in the neck wound, with consequent drainage. X-ray therapy was given. For ten years thereafter she was free of signs or symptoms of melanoma.

A woman lived for eighteen years with a known adrenal carcinoma. After the initial removal of a large adenocarcinoma of the adrenal gland, a recurrent tumor had been removed three years after the first operation, and another ten years later. A fourth recurrent tumor was also removed in the same year, necessitated by growth of the cancer through the intestinal wall. Fifteen years after the first operation, she was operated on again, at which time tumor tissue was found to be scattered throughout the upper abdomen. She improved somewhat during treatment with stilbestrol. During these years she had also had severe hypertension ranging from 200/130 to 175/100. The lower figures were obtained just after a recurrent tumor had been removed. She died eighteen years after the first operation, ostensibly from a cerebral hemorrhage, which was probably not directly connected with the neoplasm.

Although the average length of life of patients with leukemia, even of the chronic type, is exceedingly brief, the outlook may not be so poor in the exceptional individual case. Wintrobe and Hasenbush (12), in a study of their own 86 cases and others collected from the literature, found that the average length of life in 129 patients with chronic lymphocytic leukemia and 236 with chronic myelogenous leukemia was 3.52 and 3.34 years, respectively. Moffitt and Lawrence (13) tabulated some cases of unusually long survival with these diseases and found the average survival time to be 8.16 and 6.33 years, respectively.

The exceptional patient may live much longer, however. McGavran (14) reported a case of chronic lymphatic leukemia of twenty-five years' known duration. The illness was diagnosed in 1911. From 1926 to 1934 the patient re-

quired roentgen therapy. The leukemia progressed very slowly, and it is the opinion of the author that if it were not for the patient's cardiovascular disease, he would have lived much longer.

Minot (15) described a young man in whom he had diagnosed acute leukemia. This patient also presented severe anemia and thrombocytopenic purpura. Bleeding from the gums and nose was severe, lymph nodes were enlarged and soft, and the spleen was palpable. Although the diagnosis of acute leukemia was tenable by modern standards, the fact that the patient recovered made Minot doubt his original diagnosis.

Melanomas are considered among the most malignant of all tumors because of the rapid and widespread growth once metastases appear. When this occurs, hardly an organ escapes, and for this reason the prognosis is exceedingly grave. Occasionally, as in the instances cited here in detail, the situation may not be so desperate.

Hutner (16) reported a patient in whom, thirty-six years after removal of the contents of the right orbit for an intraocular tumor (presumably a choroidal melanoma), a metastatic melanoma appeared in the breast. Seven years after a simple mastectomy, metastatic melanoma appeared elsewhere, and the patient finally died from this dissemination. The interval of thirty-six years between removal of the primary tumor and death from metastases is one of the longest reported for malignant melanoma.

Pack (17) stated that following the removal of an eye for choroidal melanoma, metastasis may lodge in the liver, but may not grow for ten to twenty years. The factors which permit such latency are not known. They may be concerned with local tissue or organ susceptibility, or with the general reaction of the host. Ewing (18) reported a patient observed by Fisher and Box, in whom a large metastasis to the liver appeared fourteen years after removal of an eye for choroidal melanoma. Ewing also mentioned a patient in whom there was local recurrence twenty-four years after removal of a melanoma. Pringle (19) reported 12 patients with cutaneous melanosarcoma who had lived for thirty and thirty-eight years respectively without a recurrence or metastasis, after radical resection of the tumor and of the involved lymph nodes. No other treatment was given. Wilbur and Hartman (20) mentioned a patient who lived thirty-two years with melanoma before metastases occurred.

Of great interest are the clinical histories of 2 women, aged 27 and 20 years respectively, who were treated for chorionic trophoblastic tumors of the uterus, and who had radiologic evidence of pulmonary metastases (Nolan *et al.* (21)). In both instances, pelvic surgery and therapy with cobalt 60 were utilized. The patients had survived twenty-four and eighteen months respectively without recurrence. Nolan and associates agree with Novak that, although histologic structure is important as a guide for the conduct of therapy, there are discrepancies between the clinical activity of a tumor and its histologic appearance. They also point out that even normal trophoblastic tissues frequently exhibit properties associated with malignant tissues—for example, rapid growth, local

invasion and distant metastases. Trophoblastic tissue is derived from the ovum, and the usual tumor tissues are derived from the host, but the difference between the biologic activities of benign and malignant trophoblastic tissues seems to lie in the degree of restraint or control exercised by the host. Since there are no measurements of possible host reaction to the tumor, it is necessary to rely on the pathologist's opinion of the morphologic appearance of the tumor.

Cushing and Wolbach (5) reported the interesting case of malignant sympathicoblastoma (neuroblastoma) which changed into benign ganglioneuroma. The patient was a male child, aged 2, who had an intervertebral tumor of the hour-glass type with symptoms of cerebral metastases. The extravertebral portion of the growth was removed. It was originally diagnosed as a spindle-cell sarcoma, but on later review proved to be a typical neuroblastoma. The child was given small doses of Coley's toxin, whereupon the intervertebral tumor diminished, and the cerebral symptoms disappeared. Ten years later, severe symptoms returned, and the intraspinal portion of the tumor was removed by Cushing. This time the tumor consisted of ganglion, capsular, and sheath-of-Schwann cells. There was no trace of the type of cell seen ten years earlier. Thus, associated apparently with administration of Coley's toxin, there was a change from actively growing neuroblastoma cells to ganglion, capsular and sheath cells.

Phillips (22) noted that neuroblastoma, next to leukemia, is the most common tumor in childhood. It is usually a disease of great severity and almost invariably terminates fatally. In 65 fatal cases, the average duration of life was eleven months. He presented a child, however, in whom neuroblastoma with multiple subcutaneous metastases was discovered at the age of 4 months, and who was alive thirteen years later with no evidence of the disease after therapy with Coley's toxin and irradiation. He also cited a patient who was 14 months old when neuroblastoma was discovered along with mediastinal and lymph node metastases, and who was alive seven years later without evidence of disease after treatment by irradiation. In addition he presented patients who were alive without evidence of the disease six, six, five and three years after diagnosis, following treatment by partial or complete removal of the tumor and irradiation. Phillips stated that the natural history of neuroblastoma showed a tendency to spontaneous remission, and if a fatal termination could be prevented during the actively malignant phase of the growth by sustaining the patient and by therapy, the disease might assume a less aggressive and more chronic form and ultimately might be brought under control.

Penfield and Feindel (23) reported a patient who survived seventeen years after operative removal of a cerebellar medulloblastoma, which on histologic examination suggested rapid growth. This patient had a child four and a half years after the initial operation. Nine years postoperatively symptoms returned. Craniotomy was carried out, but no recurrence was found. Since recurrence elsewhere in the cranium was suspected, x-ray therapy was given. There was a remission, but symptoms returned again sixteen years postoperatively, and the patient died one year after the last recurrence.

Ingraham and Bailey (24) recorded a patient who had symptoms of a cerebellar tumor and who was treated with x-ray therapy. The tumor was identified as a medulloblastoma nineteen years after the onset of symptoms.

Recently an additional ray of hope has been held out for patients with neuroblastoma. In a series of 94 patients, injection of vitamin B_{12} had an appreciable effect in nearly 50 per cent (25). Results were considered encouraging because the disease in these patients was not amenable to surgery or radiotherapy, usually showing evidence of direct or metastatic spread of the neoplastic process. Regression, even when temporary, was impressive. Perhaps the vitamin allowed maturation of the embryonic cell, and thus it was brought under control.

DOES PROLONGED SURVIVAL IN CANCER PATIENTS DEPEND ON AN IMMUNITY MECHANISM?

There are several fundamental questions that we must ask ourselves in relation to the cancer cell. Unfortunately we do not know the answers in each instance, but we should examine the questions nevertheless (26).

1. When epithelial hyperplasia occurs from whatever cause, what determines whether the hyperplasia will be physiologic and regress after the stimulus is no longer active, or progress and develop into a neoplasm?

2. When a benign neoplasm has already formed, what determines its rate of growth? What situations will determine whether such a tumor will progress or retrogress or even change into a malignant tumor, *e.g.*, a polyp of the colon changing into a carcinoma of the colon?

3. When cancer has become established, what situations determine whether it will grow swiftly or slowly, and whether it will or will not metastasize? What factors may contribute to the "spontaneous" disappearance of a malignant tumor? This last situation is rare; yet the fact that it does occur under exceptional circumstances makes it worthwhile to examine these exceptional circumstances.

4. What factors determine the length of the latent period between removal of cancer and recurrence? The fact that this latent period may be twenty-five years or more makes a study of these long free intervals worth while.

Black, Speer and Opler (27) attempted to equate the answers to some of these questions under the following headings:

1. The intrinsic malignant potential of the tumor itself. Under this heading, the authors noted the wide divergence between microscopic structure and clinical behavior. Although in many instances the biologic behavior of the cancer parallels the degree of structural anaplasia, it is impossible to predict the behavior in individual cases. Under the circumstances, other influences, in addition to the malignant potential must perforce modify the clinical behavior of the tumor.

2. Tumor-trophic factors. It is well known that certain clinical states modify the clinical behavior of certain cancers, *e.g.*, the effect of pregnancy on the increased lethality of breast cancer, chronic myelogenous leukemia, Hodgkin's disease and melanoma.

3. Tumor-retarding factors. Antibody reaction to tumor tissue may play a significant role in the biologic host reactivity to a malignant neoplasm. It has

also been known for years that in some cases of cancer a lymphocytic reaction around the growth limits the malignant potential and modifies the clinical behavior. An example of such a local retarding factor is the condition known as medullary carcinoma of the breast with lymphoid infiltration (4).

In addition, these authors introduced a formula for estimation of tumor lethality, assigning letters to the foregoing components. In the present state of our knowledge of each of these determinants of cancer lethality, we cannot assign proper weight to any of these factors.

As mentioned, in some cancers, both animal and human, a lymphocytic reaction around the growth limits its spread. Many of the tumors showing spontaneous regression are surrounded by lymphocytes, plasma cells and connective tissue. Gaylord and Clowes (28) noted that in regressing Jenson sarcoma implants in rats there were nodules surrounded by lymphocytes, plasma cells and connective tissue in each instance. Muir (29) noted that in certain slowly growing breast cancers, a lymphocytic and plasma cellular reaction was evident around some of the ducts that contained the cancer cells. Murphy (30), especially, championed the lymphocyte as the animal's defense against tumors. He was able to implant heterologous tumors in rats, the lymphatic tissues of which were depleted by heavy x-ray therapy. Very recently Toolan (31) extended this work, and was able to grow human tumor tissue successfully in hamsters that had received x-ray therapy or cortisone, both of which deplete lymphatic structures. If the lymphocyte is the guardian of the body against cancer, one has to explain the frequent occurrence of metastases to the lymph nodes. Murphy suggested that in these instances the lymphocytes were exhausted and the lymphogenic activity of the nodes was impaired.

Another clinical example of an attempt by the body to limit cancer growth is so-called plasma-cell mastitis (1). This disease looks like carcinoma of the breast both grossly and microscopically, except for the masses of plasma cells surrounding the ducts containing the anaplastic epithelial cells. Clinically also the condition acts like a tumor under control.

It had long been thought that lymphocytes manufacture antibodies, but it is now known that the plasma cell is the major source of antibody, and the lymphocyte makes a smaller contribution (32–36).

There are many old and recent attempts to prove antibody formation after implantation of cancers in animals. Mention has already been made of the regressing tumors in rats (Gaylord and Clowes (28)); after the cancer had regressed, challenge implants of the same tumor could not be grown in these rats. Lumsden (39, a–e) felt that he could demonstrate antibodies to malignant cells. He stated that in order to effect a cure and evoke an immunity, the gradual regression of a tumor was mandatory. This method allowed absorption of antigenic material from the dying tumor. In recent years also, Lewis, Aptekman and their associates (38, a–g), by various ingenious methods using principles similar to those of Lumsden, proved that in order to evoke immunity to implanted tumors in animals, the tumor must grow and degenerate in the host and the degenerated products, presumably containing the antigen, must be absorbed slowly.

Because of the many unknown factors in the host-tumor relationship, it is difficult to prove antibody formation to malignant tissue. Fink and her associates (39) were able to demonstrate antibody to homologous tumor in mice by anaphylactic shock. We do not know what portion of the tumor cell differs from the normal cell, but there must be a difference if the cell is to act as an antigen.

Recently Makari (40) was able to detect a specific soluble *antigen* in the sera of carcinoma patients by the use of the Schultz-Dale test on actively or passively sensitized uterine horns. This test showed a high degree of specificity and sensitivity under the best experimental conditions, results being positive in 96.8 per cent of cancer cases and in only 4.8 per cent of other diseases.

Recently, also, the Grahams (1) were able to demonstrate *antibodies* in some human subjects by the complement fixation technique, using the patients' tumor as antigen and the patients' serum as the source of antibodies. They found an antibody response in the majority of patients with amenable lesions. This may be because resistance is at a higher level in such instances. The Grahams felt that the virulence of the tumor is less important than the resistance of the host. If, in cases of cancer, there were some way to induce the production of antibodies in the host to the extent of the finding of antigen (Makari) in the serum, the cancer problem would be nearer solution.

The concepts of Green (41) are of great relevance to the problem under discussion. As a prelude it should be stated that the prevailing theory of growth and differentiation favors the "lock and key" concept. According to this theory, during normal growth molecules of complementary configuration act reciprocally as molds for each other's synthesis. Thus one cell recognizes the other as compatible with itself and no disturbance is caused. These "fingerprints" by which one cell recognizes the other as similar are called "recognition markers" by Burnet and Fenner (42), and "identity proteins" by Green (41). A cell will grow compatibly with its neighbor if it has the correct identity proteins; if not it will become antigenic. Green contends that the neoplastic cell lacks one or more identity proteins which confer tissue and individual identity on the cell. He believes that the degree of loss of such proteins determines the degree of malignancy of the cell. It appears that this loss of protein complexes or enzyme systems should make the cell antigenic and call out antibodies so that the cell would be destroyed. However, it has been shown that there is an alteration of the immunologic response in malignancy, *e.g.*, there is a reduction of proteus agglutinins in patients with malignant disease as compared to normal subjects (42).

Mellors (43) cites some recent work by Korngold at the Sloan-Kettering Institute that supports this theory. Korngold found that the gamma-globulins in multiple myeloma differ in antigenic properties from normal gamma-globulins.

Of great interest as an example of host immunity is the finding of metastatic cells in specimens of bone marrow, even in cases of localized intra-epithelial growths that have not yet invaded the sub-epithelial tissue. Only the greater portion of cancer cells can be eradicated at operation; the defenses of the host must eliminate the remainder. These facts have now been substantiated from several sources (44, a, b, c).

On the other hand, some authorities deprecate the value of host resistance in cancer. Jones (2) stated that, in terms of life expectancy, the chance of survival is no better with than without treatment, and there is the possibility that therapy may shorten the survival time. The only hope held out by Jones is that during the last century there has been a decline of disease in general and this would result in fewer cases of cancer. Small and Dutton (45), in a discussion of the survival of patients with carcinoma of the breast, stated that mortality in cancer is a constant process, little affected by treatment. Age appeared to be an important factor in survival. Their survey indicated that in a few cases the death rate was normal, whereas in the majority it was increased regardless of the type of treatment. Particularly pertinent to this discussion is the paper by Macdonald and Kotin (46), who coined the term "biological predeterminism." They believe that the balance of power between neoplastic and reactive influences of the host is established in the preclinical phase of the cancer process, and that this is the limiting factor in curability of cancer.

If the concepts of Jones, of Small and Dutton, and Macdonald and Kotin prove to be true, there is still a ray of hope that identification of carcinogenic factors may yet lead to the eradication of cancer on a prophylactic basis.

Only time will tell if we can expect any practical help from the mechanisms of immunity in cancer therapy.

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ANAESTHESIA IN THE AGED. CLINICAL EVALUATION OF A SERIES OF CONSECUTIVE CASES AT A TEACHING HOSPITAL*

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The ever increasing life span of man in all civilized communities has been posing a growing number of new problems to the medical profession for some time. Together with all the other disciplines the anaesthetist has been faced with an ever greater number of patients in the geriatric age group. Not only did this in itself pose its special problems, but as these were solved, the operations undertaken in these older people soon became increasingly ambitious, so that today there are very few procedures that are not being attempted in the aged. Moreover, operating time has markedly increased over the years, since with antibiotics, intravenous therapy and improved anaesthesia the surgeon has no longer felt the urge to complete the operation as quickly as possible, and has concentrated on a more deliberate technique.

Papers are published from time to time which try to show that one particular type of anaesthesia is superior to another type, or one agent or combination of agents is superior to another, advocating its almost universal adoption under certain circumstances. We have not taken this view and have always maintained that almost any anaesthetic agent or technique is satisfactory, provided no definite contraindications exist in the particular case. We believe this applies also to the aged, provided the principles of good anaesthesia are not violated. These principles are 1) adequate tissue oxygenation, 2) maintenance of vital functions at as normal a level as possible, and 3) avoidance of unnecessary drugs and a very significant reduction in the amounts of narcotics, anaesthetics and ancillary agents used. Adequate tissue oxygenation in turn implies a free airway, good tidal volume, adequate supply of oxygen, efficient circulation and optimum oxygen-carrying capacity of the blood. Incidental to adequate ventilation, but at least equally as important, is satisfactory elimination of carbon dioxide. Violations of these principles in the fit adult will usually be tolerated and, unless the abuse be extreme, the patient will come to no permanent harm, although his anaesthetic and postanaesthetic course may be somewhat stormy. On the other hand, in the aged no such liberties may be taken, since functional activity is decreased, vital reserves depleted and internal homeostasis less adaptable. The principles of good anaesthesia must be carried out to the letter at all times. If they are strictly adhered to, it is our belief that the aged tolerate anaesthesia and extensive surgery quite well and results—at least from the anaesthetist's point of view—are comparable with those in any age group.

* Presented before the Annual Meeting of the American Geriatrics Society, Chicago, Illinois, May 3 and 4, 1956.

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When the idea of this paper was conceived, we did not know what our results would be, and only after March 31, 1956 did we start to tabulate and analyze our data. Our series begins with the opening of the University Hospital, the teaching hospital of the University of Saskatchewan College of Medicine, on January 26, 1955, and thus extends over a period of fourteen months. During that time the hospital was gradually activated until by March 31, 1956, 450 out of 520 beds were occupied. This gradual enlargement of hospital facilities accounts for the relatively small total number of cases over the period under investigation. All anaesthesia procedures were either carried out or supervised by three full-time members of the staff. In the majority of instances, the actual anaesthetic was administered by the residents in the Department of Anaesthesia. Although this small number of individuals guarantees a certain uniformity of data as far as documentation and analysis are concerned, it represents on the other hand a training background of a newly assembled staff which is very different for each of them, so that each caused anaesthesia to be conducted in a somewhat different manner and according to his own likes, dislikes and training background. This fact is unique, in that it allows us to evaluate the number of anaesthetics given by entirely different methods, but always with due regard to the basic principles of good anaesthesia.

ANALYSIS OF DATA

Total number of anaesthetic procedures

During the period under discussion, 2,270 anaesthesias were undertaken by the Department of Anaesthesia. Five hundred and sixty of these (24.7 per cent) were in patients 60 years and older, 405 (17.8 per cent) in patients 65 years and older, and 262 (11.5 per cent) in patients 70 years and older. Thus almost every fourth anaesthetic was administered to a person of 60 years of age or over and nearly every eighth administration was to a person of 70 years or over (Table 1). This study concerns the 405 anaesthetic procedures carried out in 300 patients 65 years of age and over.

Age groups

It is always a matter of arbitrary judgment to define the geriatric age group, since physiologic old age is by no means identical with the chronologic age. In further analysis of our cases the age group 60–64 has been omitted and we shall refer only to individuals of 65 years of age and over. The 405 anaesthesias to be

TABLE 1

Geriatric Component—2,270 Anaesthesias (All Ages)

Age of Patient	Male	Female	Total	Per cent of 2,270 Anaes., All Ages
60 years and over	389	171	560	24.67
65 years and over	281	124	405	17.84
70 years and over	188	74	262	11.54

TABLE 2

Age Groups

Age	Male		Female		Total	
	A	P	A	P	A	P
65–69 years	93	75	50	39	143	114
70–79 years	167	108	65	53	232	161
80–89 years	20	16	8	7	28	23
90 years and over	1	1	1	1	2	2
	281	200	124	100	405	300

A = Anaesthesias.
P = Patients.

TABLE 3

Operations

(405 cases)

Type of Operation	Age 65–69		Age 70–79		Age 80–89		Age Over 90		Total
	Male	Female	Male	Female	Male	Female	Male	Female	
General surgical	47	18	63	35	9	7	1	1	181
Genito-urinary	30	2	87	—	7	—	—	—	126
Gynaecologic	—	23	—	20	—	—	—	—	43
Plastic	7	1	8	3	—	—	—	—	19
Orthopaedic	1	2	6	6	1	1	—	—	17
Neurosurgical	5	3	—	1	—	—	—	—	9
ENT & endoscopy	—	—	2	—	3	—	—	—	5
Thoracic	2	—	1	—	—	—	—	—	3
Ophthalmic	1	1	—	—	—	—	—	—	2
	93	50	167	65	20	8	1	1	405

considered (281 in men and 124 in women) were carried out in 300 patients (200 men and 100 women). The ratio of men to women was 2:1 (Table 2). It is evident from the figures that many multi-stage operations were performed.

Operations

The overwhelming majority of operations were in the combined fields of general and genito-urinary surgery, which together accounted for 307 out of 405 operations (Table 3). This is understandable when one considers that practically all cancer surgery comes under the heading of general surgery, and also the great preponderance of genito-urinary surgery in the male. Only a small minority of genito-urinary diagnostic procedures were carried out under local anaesthesia.

Physical status

This has been defined by the American Society of Anesthesiologists. The physical status does not denote the surgical or anaesthetic risk but simply the presence

or absence and the severity of any systemic disease which may influence anaesthetic management. Thus physical status I denotes a patient with no systemic disease; status II, one with mild systemic disease; status III, one with severe systemic disease; and status IV, one with very severe systemic disease which constitutes a threat to life. Status V refers to emergency operations on patients in status I or II; and status VI refers to such operations on patients in status III or IV. It may be seen from Table 4 that almost 50 per cent of all patients were in status II; they had mild systemic disease, usually some anaemia, a mild degree of pulmonary emphysema, or a somewhat elevated blood pressure. Physical status III was the next most frequently observed; these patients had more severe degrees or combinations of the aforementioned complications, or other disease states.

Indications for operation

On the basis of the physical status it became at once possible to separate elective from emergency operations. These data are summarized in Table 5. It is surprising that 96 per cent were elective procedures and only 4 per cent were

TABLE 4

Physical Status of Patients

Age		I*	II	III	IV	V	VI	Total
65–69:	male	14	49	24	3	2	1	93
	female	6	20	20	—	4	—	50
70–79:	male	8	90	54	9	2	4	167
	female	4	30	28	1	1	1	65
80–89:	male	3	8	5	3	—	1	20
	female	—	3	4	1	—	—	8
Over 90:	male	—	1	—	—	—	—	1
	female	—	—	—	1	—	—	1
		35	200	135	18	9	7	405

* I–VI: *see* text for explanation.

TABLE 5

Indications for Operation

(405 cases)

Physical Status of Patient	Elective Operation	Emergency Operation
I	35	
II	201	
III	135	
IV	18	
V		9
VI		7
	389 (96%)	16 (4%)

TABLE 6

Types of Anaesthesia

(405 cases)

Age of Patient		General Anaes.	Regional Anaes.
65–69:	male	65	28 (30%)
	female	43	7 (14%)
70–79:	male	103	64 (38.3%)
	female	49	16 (24.6%)
80–89:	male	16	4 (20%)
	female	6	2 (25%)
Over 90:	male	1	—
	female	—	1
		283	122 (30.1%)

emergency operations. This emphasizes the increased confidence of the surgeon in tackling electively almost any surgical disease in the aged.

Types of anaesthesia

Most procedures were carried out under general anaesthesia. All forms of regional anaesthesia together accounted for 30 per cent of the total (Table 6). This is somewhat higher than the proportion of regional anaesthesias in patients of the younger age group, in whom it runs in the neighbourhood of 10–15 per cent in our institution. It is accounted for by the relatively large number of genito-urinary procedures which can be performed so well and safely under low spinal anaesthesia in the presence of a multitude of complicating conditions.

General: In our general anaesthesia series (Table 7a) sodium thiopental (Pentothal®) was used for *induction* in the great majority of patients (271 out of 283); in a small number anaesthesia was induced with other agents (mostly cyclopropane). Sodium thiopental is a safe agent in elective operations in all age groups, provided the dose is strictly adjusted to the individual patient. We shall have occasion to refer to the role of sodium thiopental as an induction agent later in this paper. For *maintenance* of anaesthesia (Table 7b), the combination of nitrous oxide and trichlorethylene (Trilene®; Trimar®) was preferred. This was due in a large degree to the need for a nonexplosive technique, especially in diagnostic genito-urinary work, neurosurgery and in a fair proportion of general surgical cases in which electrocautery was used. We have not been in favour of supplementing nitrous oxide with large doses of sodium thiopental. The cases that were managed in this fashion usually involved short procedures which required only very small supplements of sodium thiopental for a short period of time. Continuous intravenous drip of dilute sodium thiopental was not used, since we feel that trichlorethylene is much superior for the purpose of supplementing nitrous oxide. In cases in which a nonexplosive technique was not required, either cyclopropane, cyclopropane with ether, or cyclopropane followed by nitrous oxide was satisfactory. In a few instances nitrous oxide was supplemented by

TABLE 7a

General Anaesthesia. Induction Agents

(283 cases)

Age and Sex of Patient		Sodium Thiopental	Cyclopropane	Nitrous Oxide
65–69:	male	62	3	—
	female	42	—	1
70–79:	male	100	2	1
	female	45	4	—
80–89:	male	15	1	—
	female	6	—	—
Over 90:	male	1	—	—
	female	—	—	—
		271	10	2

TABLE 7b

General Anaesthesia. Principal Maintenance Agents

(283 cases)

Age and Sex of Patient		Nitrous Oxide	N_2O-Na Thiopental	N_2O-Trichlorethylene	N_2O-Ether	N_2O-Cyclopropane	N_2O-Meperidine	N_2O-Alphaprodine	Cyclopropane	Cyclopropane-Ether	Cyclopropane-N_2O	Ether-N_2O
65–69:	male	5	12	32	1	—	2	1	1	7	4	—
	female	4	3	18	1	1	2	—	2	9	3	—
70–79:	male	5	8	67	3	3	—	—	3	8	5	1
	female	—	—	22	3	2	1	—	6	9	4	2
80–89:	male	—	1	9	—	2	—	—	1	1	2	—
	female	1	—	2	2	—	1	—	—	—	—	—
Over 90:	male	—	—	—	—	—	—	—	—	1	—	—
	female	—	—	—	—	—	—	—	—	—	—	—
		15	23	150	10	8	6	1	13	35	18	3

TABLE 7c

General Anaesthesia. Muscle Relaxants

(283 cases)

Age and Sex of Patient		D-Tubocurarine	Dimethyl Tubocurarine	Gallamine	Succinylcholine	D-Tubocurarine & Succinylcholine	Gallamine & Dimethly Tubocurarine	Succinylcholine & Dimethyl Tubocurarine	Total	Per Cent, General Anaes. in this Age-group
65–69:	male	11	11	1	11	—	1	1	36	55.4
	female	5	7	2	10	—	2	1	27	62.8
70–79:	male	6	9	8	12	1	2	—	38	36.9
	female	4	7	5	11	1	—	2	30	66.6
80–89:	male	1	2	1	3	—	—	—	7	43.8
	female	1	3	—	—	—	—	—	4	66.6
Over 90:	male	—	1	—	—	—	—	—	1	100
	female	—	—	—	—	—	—	—	—	—
		28	40	17	47	2	5	4	143	50.5

TABLE 7d
General Anaesthesia. Endotracheal Intubation
(283 cases)

Age and Sex of Patient	Total	Per Cent, General Anaes. in this Age-group	Proportion of Intubations to Relaxants
65–69: male	33	50.8	1:1.09
female	23	53.7	1:1.18
70–79: male	32	31.1	1:1.19
female	36	73.5	1.2:1
80–89: male	7	43.8	1:1
female	4	66.6	1:1
Over 90: male	1	100	1:1
female	—	—	—
	136	48	1:1.05

meperidine (Demerol®), but this combination is potentially too much of a depressant in the older age groups. *Muscle relaxants* were used rather extensively. In fact one or the other muscle relaxant was given to somewhat over 50 per cent of the patients in this series (Table 7c), compared with 35–40 per cent in all age groups. However, one must take into consideration that a great many of our patients were edentulous, and therefore an unusually large proportion of them had to be intubated for even short procedures in order to assure patency of the airway and adequate ventilation. We have no particular preference for any one muscle relaxant. We used dimethyltubocurarine (Metubine®; Mecostrin®) for the shorter procedures because the duration of its action is somewhat shorter than that of *d*-tubocurarine and because it has respiration-sparing properties. Gallamine triethiodide (Flaxedil®), because of its atropine-like effects, was reserved for patients with an abnormally slow pulse rate or a moderately low blood pressure. Succinylcholine (Anectine®; Quelicin®; Sucostrin®) in a single injection was used frequently when relaxation was required for a relatively easy intubation; it was given as a continuous drip in several cases, for more prolonged relaxation. To our minds succinylcholine has no great advantages over dimethyltubocurarine. *Endotracheal intubation* was used more often (Table 7d) in the geriatric age group; indeed, the incidence of 48 per cent ran fairly parallel to that of muscle relaxants, the proportion being 1:1.05.

Regional: Analysis of the cases of regional anaesthesia (Table 8) shows that the majority were subarachnoid spinal blocks. This type of anaesthesia was reserved for lower abdominal, pelvic, perineal and lower-extremity operations. Continuous spinal anaesthesia was used for either abdomino-perineal resection or nailing of hip fractures. When regional anaesthesia was decided upon for an upper abdominal procedure, a continuous epidural block was induced, using a polyethylene catheter. Some upper-extremity operations were performed under brachial-plexus block. In 1 patient who was a very poor risk, a leg amputation was carried out on the refrigerated limb.

TABLE 8
Regional Anaesthesia
(122 cases)

Age and Sex of Patient	Spinal	Cont. Spinal	Epi-dural	Cont. Epi-dural	Bra-chial Plexus	Field Blocks	Refrig-era-tion	Topical
65–69: male	20	1	1	5	1	—	—	—
female	5	—	—	2	—	—	—	—
70–79: male	43	4	—	11	1	4	1	—
female	4	1	3	3	2	3	—	—
80–89: male	1	2	—	—	—	—	—	1
female	—	2	—	—	—	—	—	—
Over 90: male	—	—	—	—	—	—	—	—
female	—	—	—	—	—	1	—	—
	73	10	4	21	4	8	1	1

TABLE 9
Poor-Risk Cases

Physical Status	General Anaesthesia			Regional Anaesthesia	Total
	Na Thiopental Induction	Induction with Other Agents	Total		
IV	8	3	11	7	18
VI	2	3	5	2	7
	10	6	16	9 (36%)	25

	All Cases	Poor-Risk Cases
Percentage of regional anaesthesias	30	36
Percentage of induction with agents other than sodium thiopental	4	37

Poor-risk cases

We shall now consider the management of poor-risk patients, that is, those in the categories covered by physical status IV and VI. It may be seen from Table 9 that the physical status of the patient had no influence on the use of regional anaesthesia, but that it had distinct bearing on the use of sodium thiopental as an induction agent. Anaesthesia was induced with agents other than sodium thiopental in 37 per cent of the poor-risk patients, compared to only 4 per cent in the total group. This reflects our conviction that sodium thiopental is a very dangerous agent in states of either frank or compensated shock, since by its vasodilator action it destroys any compensation that may still be effective, and unduly depresses the vital medullary centers.

Preoperative pathologic conditions

By far the most common preoperative complication was pulmonary emphysema; the next was hypertension (Table 10a). (For our purposes, hyper-

tension is defined as a systolic blood pressure of 160 mm. Hg and over, in the presence of a diastolic pressure below 100 mm. Hg—or a systolic blood pressure in any range, if the diastolic is 100 mm. Hg or above.) The third most common preoperative condition was anaemia (haemoglobin below 12.5 Gm.). No attempt was made to set different standards for the sexes.

The sex distributions of the more common preoperative pathologic conditions are listed in Table 10b. It may be seen that pulmonary emphysema was over four times as common in the male as in the female, whereas hypertension was more than twice as common in the female as in the male; excessive obesity was five times as common in the female as in the male. No significant sex difference was found for weight loss, anaemia or diabetes.

TABLE 10a
Preoperative Pathology

Pathologic Conditions	Age 65–69		Age 70–79		Age 80–89		Age Over 90		Tota
	Male	Female	Male	Female	Male	Female	Male	Female	
Respiratory									
Emphysema	28	6	86	6	10	1	—	—	137
Bronchial asthma	3	—	3	—	—	—	—	—	6
Dyspnoea	2	—	1	1	—	—	—	—	4
Other major	1	1	3	1	—	—	—	1	7
Other minor	8	2	14	9	3	2	—	—	38
Cardiovascular									
Hypertension	9	18	28	23	4	1	—	1	84
Other major	11	6	36	19	5	3	—	1	81
Other minor	10	5	17	3	4	1	—	—	40
Metabolic									
Diabetes	7	4	4	2	1	—	—	—	18
Obesity	8	8	3	11	—	—	—	—	30
Weight loss	5	4	14	7	2	1	—	—	33
Others	2	1	6	1	4	—	—	—	14
Others									
Nausea and vomiting	1	3	9	4	2	1	—	—	20
Anaemia	12	9	29	18	5	2	—	—	75
Jaundice	—	1	3	2	—	—	—	—	6
Headache	1	—	8	3	—	—	—	—	12
Raised intracranial Pressure	2	—	—	—	—	—	—	—	2

TABLE 10b
Sex Incidence of Preoperative Pathology

	Male	Female
Hypertension	14.6%	34.7%
Weight loss	7.5%	9.7%
Emphysema	44.1%	10.5%
Anaemia	16.4%	23.4%
Obesity	3.9%	15.3%
Diabetes	4.3%	4.8%

Postoperative complications

Postoperative complications unconnected with pre-existing pathologic conditions are listed in Table 11. As expected, nausea and vomiting were the most frequent postoperative symptoms, followed in incidence by such minor manifestations as simple tachycardia. With regard to regional injection of anaesthetics, it

TABLE 11
Postoperative Complications

	Age 65–69		Age 70–79		Age 80–89		Age Over 90		Total
	Male	Female	Male	Female	Male	Female	Male	Female	
Respiratory									
Pneumonia	—	2	3	1	—	—	—	—	6
Aspiration	—	—	—	1	—	—	1	—	2
Pulmonary embolus	—	—	1	—	—	—	—	—	1
Pleural effusion	1	—	1	—	—	—	—	—	2
Atelectasis	1	—	1	—	—	—	—	—	2
Laryngitis	2	—	—	2	—	—	—	—	4
Tracheotomy	—	—	1	—	—	—	—	—	1
Cough	6	—	5	1	—	1	—	—	13
Hiccough	1	—	1	—	—	—	—	—	2
Other minor	2	3	3	1	—	—	—	—	9
Cardiovascular									
Cardiac failure	—	—	—	1	1	—	—	—	2
C.V.A.	—	—	2	—	—	—	—	—	2
Pulmonary oedema	—	—	1	—	—	—	—	—	1
Thrombophlebitis	1	1	—	—	—	—	—	—	2
Tachycardia	11	4	13	13	1	3	—	—	45
Bradycardia	—	—	—	—	1	—	—	—	1
Hypertension	1	—	1	—	—	—	—	—	2
Hypotension	1	—	1	1	1	—	—	—	4
Other minor	—	1	1	—	—	—	—	—	2
Gastro-intestinal									
Nausea and vomiting	5	12	17	22	1	—	—	—	57
Pharyngitis	3	3	3	3	—	—	—	—	12
Parotitis	1	—	—	—	—	1	—	—	2
Dysphagia	1	—	—	—	—	—	—	—	1
Distension	1	—	2	—	—	—	—	—	3
Central nervous system									
Headache	1	1	5	6	1	—	—	—	14
Headache, post-L.P.	1	—	5	1	—	—	—	—	7
Depression	1	—	—	—	—	—	—	—	1
Confusion	—	—	5	1	2	—	—	—	8
Others									
Bachache	1	—	2	—	—	—	—	—	3
Backache, post-L.P.	2	1	3	—	—	—	—	—	6
Anaemia	—	—	2	—	—	—	—	—	2
Uraemia	—	—	1	—	—	—	—	—	1
Peripheral oedema	—	—	—	1	—	—	—	—	1
Dehydration	—	—	1	—	—	—	—	—	1
Overtransfusion	1	—	—	—	—	—	—	—	1

is interesting to note that lumbar-puncture headache accounted for only one third of all postoperative headaches, whereas lumbar-puncture backache was twice as common as backache after general anaesthesia. The incidence of severe respiratory and cardiovascular complications was small. One patient was over-transfused postoperatively; this is a tremendous hazard in the aged.

Unusual situations

1. The heaviest patient in this series was a 65-year-old woman weighing 240 pounds who was anaesthetized twice for insertion of cobalt in the treatment of carcinoma of the body of the uterus. In addition to marked obesity, her blood pressure was 180/100. The operation was carried out in the knee-chest position, which necessitated endotracheal intubation in order to assure a free airway and adequate ventilation. The two procedures lasted twenty-five and thirty-five minutes, respectively. The first anaesthesia was induced with sodium thiopental and maintained with nitrous oxide, trichlorethylene and cyclopropane. The second anaesthesia was induced with sodium thiopental and maintained with cyclopropane, ether and nitrous oxide.

2. The lowest haemoglobin level observed preoperatively was 5 Gm. per cent in a 70-year-old man who underwent revision of gastro-enterostomy for carcinoma of the stomach. Gastro-enterostomy had been carried out six weeks before, under anaesthesia by continuous epidural block; at that time his haemoglobin level had been 11.9 Gm. per cent. By the time he was re-operated on, he had lost 15 pounds, and there was marked emphysema; he had attacks of nausea and vomiting, and was quite cachectic. Nitrous oxide and trichlorethylene only were employed for anaesthesia and the surgeon cooperated by infiltrating the area of operation with 1 per cent procaine. Apart from hypotension, this patient did well postoperatively.

3. The longest operation was a thoraco-abdominal total gastrectomy with splenectomy and partial pancreatectomy in a 66-year-old man weighing 101 pounds. As there was no outstanding preoperative systemic pathology, anaesthesia was induced with sodium thiopental and maintained with nitrous oxide-meperidine reinforced by chlorpromazine (Thorazine®; Largactil®). Relaxation was obtained with succinylcholine. The operation lasted six hours and fifty-five minutes and the postoperative course was uneventful.

4. The oldest patient in our series was a 92-year-old man who underwent subtotal gastrectomy for carcinoma of the stomach in a procedure lasting three hours and five minutes. He was given a general endotracheal anaesthetic, using a small amount of sodium thiopental for induction; anaesthesia was maintained with cyclopropane and ether, while relaxation was obtained with dimethyltubocurarine. Despite the fact that the interne in the postoperative period introduced the feeding tube into the trachea instead of the stomach and fed the patient a hearty meal of milk into his tracheo-bronchial tree, he made an otherwise uneventful recovery after the anaesthetist had removed the milk by endotracheal suction. He left hospital in good general condition.

5. A 73-year-old man was anaesthetized eight times for genito-urinary pro-

cedures, one of them a retropubic prostatectomy under subarachnoid spinal block, and the remainder diagnostic or minor operations under sodium thiopental-nitrous oxide-trichlorethylene anaesthesia. He did well on all occasions.

Adjunctive medication

Seventeen patients received chlorpromazine for premedication; 2 of them were in the category of physical status IV. Two patients received promethazine (Phenergan®) as part of the premedication program, because they gave a history of bronchial asthma and this drug was used to prevent an attack in the course of anaesthesia. Four patients were given chlorpromazine in the course of general anaesthesia; 1 of these was in the category of physical status IV. Three other patients were given chlorpromazine in the course of regional anaesthesia. Chlorpromazine-promethazine premedication was used in 2 instances. Hypotension was induced and controlled with trimethaphan (Arfonad®) in 3 operations for extensive resection of carcinoma of the lip in a 70-year-old man, and once for laminectomy and removal of a spinal tumour in the upper thoracic region in a 66-year-old female. On one other occasion the drug was used to lower uncontrollable hypertension in the course of anaesthesia.

Deaths

Sixteen patients died in the postoperative period, while still in hospital; 13 of these died within thirty days of operation. Thus, in this series, death occurred in 5.3 per cent of the patients and in connection with 3.9 per cent of the operative procedures. Adjusted for deaths within thirty days of operation, the figures were 4.3 per cent and 3.2 per cent, respectively.

Only 1 patient died within twenty-four hours of the end of anaesthesia. This was a 68-year-old man who had undergone left temporal trephining and biopsy of an intracranial tumour; preoperatively he had high intracranial pressure with periodic breathing, marked weight loss and pulmonary emphysema. He regained consciousness promptly at the conclusion of the anaesthesia but died thirteen hours later in an attack of recurrent intracranial hypertension. Anaesthesia in this case was not contributory to the fatal outcome.

Eleven patients died as a direct result of the disease for which they had undergone operation; in the large majority this was extension or spread of malignant disease. The remainder died from intercurrent disease. Only in 1 patient was anaesthesia presumed to have been contributory. This was a 74-year-old female (physical status III) who was deeply jaundiced due to disease of the common bile duct. She underwent cholecystectomy and repair of the common bile duct under continuous epidural anaesthesia. Her preoperative blood pressure had been 180/80. During operation, a blood pressure of 80/60 was allowed to persist for one hour and forty minutes in the presence of a slow pulse and adequate peripheral circulation. She died on the tenth postoperative day in a state of renal and hepatic failure. Although this condition is not an uncommon occurrence after bile-duct surgery in deeply jaundiced patients, the onus of proof is on the anaesthetist that the period of hypotension was not contributory.

DISCUSSION

In reviewing the literature on geriatric anaesthesia, one is struck by the relative uniformity of results obtained by various investigators and the similarity of their conclusions. The present series is no exception. This might be expected, since recognition by the anaesthetist of the problems involved in geriatric anaesthesia will cause him to adapt his management and technique to suit the special needs of the older patient. It may be well to reiterate the various physiologic changes which take place in the geriatric individual.

Physiologic considerations

Central nervous system: With aging, the general reduction in the metabolic needs of the body also involves the brain. The decrease in vascularity, size and weight of the brain, and the general mental and reflex sluggishness imply that there is a decrease both in the cerebral supply of oxygen and its utilization. As elsewhere in the body, functional reserves are small and even a small decrease in oxygen supply is likely to cause irreversible damage. Impaired memory, decreased attentiveness and labile emotions have their repercussions in the preoperative and postoperative management of these patients. Postoperative confusion is frequent. On the other hand, the geriatric patient is less susceptible to new and strange experiences and generally faces operation more calmly than younger individuals.

Cardiovascular system: The hazard of anaesthesia is increased by the weakened, often hypertrophied and fibrotic myocardium, the decrease in the coronary bed, and the sclerotic and therefore frequently incompetent valves of the heart. Atheromatous changes involving reduced elasticity of the blood vessels, increased arterial and venous pressures and sluggish peripheral circulation, together with depressed compensatory reflexes make the vascular tree less adaptable to changes. Hence sudden fluctuations in arterial pressure must be avoided; once hypotension is allowed to occur it is more difficult to correct than in the younger person and is poorly tolerated. The case described here of postoperative death following a period of hypotension despite peripheral vasodilatation, is an example. For the same reason controlled hypotension is only rarely permissible in the aged, and then only if the indications are overwhelming and the state of the cardiovascular system permits its use. It is this lack of cardiovascular resilience and the impaired cardiac reserve which make over-transfusion so hazardous in these patients.

Respiratory system: The incidence of pulmonary emphysema and fibrosis is striking. Although tidal volume tends to remain within normal limits, the vital capacity is frequently decreased and residual air increased. It follows that these patients suffer from chronic hypercapnia which, in turn, implies a decreased sensitivity of the respiratory center to carbon dioxide. Unduly high concentrations of oxygen tend to reduce the excess carbon dioxide; in the presence of the decreased sensitivity of the centers this will lead to inadequate ventilation or even apnoea. Although this is no great problem when it occurs during anaesthesia with assisted respiration, it may become a serious complication in the

immediate postoperative period when assistance to respiration is no longer provided and when oxygen may be administered to excess. The presence of chronic hypercapnia renders severe respiratory acidosis more likely in the absence of an adequate tidal exchange; and the reduced reserves of the buffer system are unable to correct this tendency.

Blood: Blood volume, haemoglobin concentration and red blood cell count tend to be decreased; thus anaemia is a common finding. In the absence of complicating disease, the levels of blood chemical elements tend to remain within normal limits.

Other systems: Decreased tone of skeletal muscle diminishes the need of these patients for muscle relaxants, which in any case should be used sparingly in the presence of decreased body metabolism and possible inadequate renal excretion. The possibility of fractures due to skeletal osteoporosis should engender extreme caution in the moving and positioning of these patients. The frequent arthritic changes, particularly in the spine, should make the anaesthetist pay special attention to proper positioning of the patient on the operating table and the provision of adequate support for the lumbar lordosis and the neck and head. All patients, whatever their age, should have a small pillow inserted under the head on the operating table; but this consideration becomes of paramount importance in the old person, as severe backache or even fracture of the neck may result when the head is hyperextended for endotracheal intubation.

Management of anaesthesia

The foregoing considerations in themselves suggest the proper management of patients in the geriatric age group. During the preoperative visit a careful evaluation should be made of the patient, his history and his physiologic reserves. An attempt should be made to estimate his anaesthetic requirements. In particular, his appearance should be compared with his actual age, and medication and assessment should be based on appearance rather than on chronologic age.

Enquiry should be made as to previous anaesthetic experiences and the previous administration of cortisone, corticotropin or chlorpromazine. The latter is particularly important because of the almost indiscriminate use of this agent at the present time and its marked potentiating action upon anaesthetic and narcotic agents. If chlorpromazine has been given for a considerable period of time, it would be well to defer an elective operation for a few days.

Great care should be taken to correct any deviations from normal, within the limits posed by the underlying disease for which the patient is to be operated upon. Thus anaemia, dehydration and hypovolaemia should be corrected. Proteins, if decreased, should be replenished; diabetes should be stabilized; acidosis from that disease or from any other cause should be corrected; and an attempt should be made to secure a near-normal electrolyte balance. If there is evidence of decreased cardiac reserve, digitalization may be indicated. A thorough investigation should be made of the patient's renal reserve, as this may markedly influence the choice and dose of safe anaesthetic agents.

Preoperative narcotics should be minimal and only sufficient to abolish pain, if present. For the control of apprehension, barbiturates are preferable; in this

age group, atropine is preferred over scopolamine since the latter tends to cause more frequent hallucinations.

In the actual management of anaesthesia one must remember that there is no ideal agent and no ideal technique; all have their limitations. These limitations must be strictly appreciated and respected. Contraindications which may be relative in the younger and more adaptable individual may become absolute in the aged. Although the anaesthetist will always make an attempt to meet any reasonable demands by the surgeon and try to give him the best operating conditions possible, it is frequently necessary in working with an aged and debilitated patient to strike a compromise, bearing in mind that the first and foremost obligation is to the patient. Thus, one may reluctantly have to ask the surgeon to accept the second best in operating conditions, for the good of his patient. Anaesthetic management must be individualized for the patient, for the surgeon and for the anaesthetist. There is no agent and technique that is universally superior and it is foolhardy for the anaesthetist to employ an unfamiliar agent or technique in a poor-risk patient simply because it is preferred on theoretical grounds. Agents, techniques, and their combination are legion, and rarely is there only one way of satisfactorily dealing with the geriatric patient if all the basic requirements for safe anaesthesia are met. Spinal anaesthesia has much to commend it for pelvic and perineal operations, but we feel equally strongly that it is hazardous for upper abdominal procedures. If regional anaesthesia is decided upon for high abdominal operations, we prefer to rely upon epidural anaesthesia despite its technical complexity and occasional disappointing results. In operations on the extremities, excellent anaesthesia which can be obtained with nerve blocks, especially brachial-plexus block in the upper extremity or sciatic-femoral block in the lower extremity. For the lower extremity, however, very low unilateral spinal anaesthesia is somewhat easier to carry out and the result is more predictable, unless the operator has had extensive experience with the block technique. In elderly persons, it is essential that the dose of all agents, including local anaesthetics, be markedly reduced, or disastrous and often irreversible damage may be done.

SUMMARY

A series of 405 anaesthetic procedures in 300 patients 65 years of age and over is presented and our experiences analyzed.

It is concluded that the geriatric patient withstands the stress of anaesthesia and surgery well, provided there is satisfactory management and close attention is paid to the basic principles of safe anaesthesia. It is of the utmost importance that no liberties be taken with these patients, as their requirements for all types of drugs are markedly diminished compared with those of the healthy adult. The various physiologic changes in the aged are discussed and interpreted in the light of our findings.

GENERAL REFERENCE

LORHAN, P. H.: Geriatric Anesthesia. Springfield, Illinois, Charles C Thomas, Publisher, 1955.

Abstracts of Current Literature

URINARY EXCRETION OF 17-HYDROXY-20-OXOSTEROIDS IN NORMAL HEALTH AND IN RHEUMATOID ARTHRITIS.

Appleby, J. I., and Norymberski, J. K. *Ann. Rheumat. Dis.* **14:** 172 (June) 1955.

The urinary excretion of 17-hydroxy-20-oxosteroids unsubstituted at C_{21} was studied in 26 healthy individuals and 26 patients with rheumatoid arthritis. The authors' analytic method for the group determination of urinary steroids was used. It consists of their selective conversion into 17-oxosteroids (17-ketosteroids) and measurement by means of the Zimmermann reaction. No difference was found between the two groups of subjects. In both groups there appeared to exist a tendency toward lower excretion levels with increasing age. This work and published data cited lead to the conclusion that none of the methods so far employed for the study of steroid excretion in rheumatoid arthritis has revealed a specific metabolic defect.

ASSOCIATION OF HYPOTENSIVE STATE IN MYOCARDIAL INFARCTION WITH SUBSEQUENT METABOLIC RESPONSES AND MORTALITY IN ELDERLY SUBJECTS.

Bruce, R. A.; Kowalski, H. J., and Bergy, G. G. *Circulation* **12:** 207 (Aug.) 1955.

Ten elderly patients with typical findings of acute myocardial infarction were studied for two weeks on the metabolic ward of a hospital. Six of these patients died of myocardial infarction and terminal complications within four weeks. None of the survivors had hypotension or tachycardia, evaluated by hourly determinations, during the first three days. Systolic and pulse pressures diminished gradually in the survivors. Surviving patients had higher mean venous pressures, circulation times, and volume distribution of sodium thiosulfate initially, together with reductions in each of these factors during the second week. These changes were associated with greater loss of weight, negative sodium balance, and earlier recovery from negative potassium and nitrogen balances observed in these patients. Dying patients exhibited a slight decrease in serum sodium concentration, renal conservation of sodium, expansion of volume distribution of sodium thiosulfate, as well as persistently lower blood pressures. It was concluded that the early appearance of hypotension following acute myocardial infarction presaged clinical complications and unfavorable metabolic responses as well as a fatal outcome in these patients. (Authors' summary.)

SOME EXPERIENCES WITH PHYSICAL DISABILITIES FROM CHRONIC ILLNESS IN OLD PERSONS.

Chinn, A. B., and Mason, R. *J. Chron. Dis.* **2:** 534 (Nov.) 1955.

The improvement in functional capacity of 86 chronically ill, aged persons admitted to a hospital for the management of long-term illness in elderly people was assessed. The average age of the 86 patients was 77 years. They were an unselected group who were in need of hospital evaluation, or treatment, or both. Among the principal incapacitating illnesses were cerebrovascular accident, cerebral arteriosclerosis, Parkinsonism, hypertensive cardiovascular disease, arteriosclerotic heart disease, fractures, osteoarthritis, malignant tumors, and malnutrition and general debility. The average hospital stay was slightly less than two months. Patients who might benefit from it were given intensive

physical therapy with muscular training and instruction in daily living activities, in addition to medical and surgical care. The resulting data indicated that among the group as a whole there was appreciable improvement in functional capacity and daily living activities at the end of hospital stay despite the existence of restricted physical capacities for weeks or even months previous to hospital admission. The increase in functional capacity was preserved to a large extent in the 62 patients still living one year following hospital discharge. This information should help to dispel the traditional aura of hopelessness surrounding serious illness in aged individuals. It was found that some patients with chronic illness who, before a period of observation, gave little promise of being benefited by hospital admission, gained a great deal from intensive treatment. Occasionally the reverse was true. Therefore, most aged persons with chronic illness deserve to be hospitalized, at some time, for proper evaluation and an attempt at treatment. Adherence to a policy of discontinuing hospitalization for patients no longer capable of benefiting from specific hospital facilities proved successful. The program is dependent upon a vigorous medical social service organization.

CARDIAC CHANGES IN RHEUMATOID ARTHRITIS.

Egelius, N.; Göhle, O.; Jonsson, E., and Wahlgren, F. *Ann. Rheumat. Dis.* **14:** 11 (March) 1955.

The literature on cardiac changes in rheumatoid arthritis is summarized. Most pathologic investigations recorded high percentages of cardiac changes of a rheumatic nature, the frequency of such changes in clinical investigations being much lower. Possible explanations of this discrepancy are discussed. In some earlier series, the authors may have failed to pay proper attention to previous rheumatic fever, intercurrent diseases of a cardiologic character, or changes due to old age. The present investigation is divided into pathologic and clinical sections. In 13 *postmortem* cases, none manifested any signs of rheumatoid endocarditis. Changes, such as those characterized by Sokoloff as indicative of rheumatoid heart disease, were not noted. Signs were found of pericarditis, healed or not, in 7 of the 13 cases, which supports the assumption of certain authors that pericarditis may constitute a cardiac manifestation in rheumatoid arthritis. However, in some of these 7 cases other concurrent diseases may have accounted for the pericarditis. The clinical series consisted of 100 cases of rheumatoid arthritis, and 100 control cases of the same age and sex distribution. No case with a history of rheumatic fever or other disease of cardiologic importance was included. The investigation comprised auscultation, phonocardiography, radiography of the heart, electrocardiography (with three standard leads and, in practically all cases, at least eleven chest leads), and hypoxaemia tests. When the positive findings from auscultation, phonocardiography, radiography, and electrocardiograms were taken together, they produced a final result amounting to 8 per cent for the rheumatoid group and 7 per cent for the control group. In the present series, therefore, patients suffering from rheumatoid arthritis did not manifest any increased frequency of endocardiac or myocardiac changes which might be due to arthritis. In our opinion the endocardium and the myocardium are only slightly affected in rheumatoid arthritis, though inflammation of the pericardium may, perhaps, be not infrequent. In support of the idea of a close relationship between rheumatoid arthritis and rheumatic fever, several authors have pointed to the high frequency of cardiac changes of a rheumatic nature which may be found in cases of rheumatoid arthritis, implying that these two diseases are manifestations of the same basic illness. The results of the present investigation indicate that, when the cardiac findings only are taken into account, rheumatic fever and rheumatoid arthritis should be regarded as two distinct diseases. The only significant difference was found in the results of the hypoxaemia tests, positive results being more frequent in the rheumatoid group. (From authors' summary.)

THERAPY OF "FELTY'S SYNDROME."

Ellman, P.; Cudkowicz, L., and Elwood, J. S. *Ann. Rheumat. Dis.* **14:** 84 (March) 1955.

The clinical management of 3 cases of Felty's syndrome is presented. Splenectomy is still the treatment of choice and should be performed as soon as the patient is able to undergo surgery. It is the only therapy so far known to arrest the blood dyscrasia and restore the peripheral blood picture in this syndrome characterized by normocytic hypochromic anemia, leucopenia, splenomegaly, and progressive arthritis. Subjective improvement in the joints of the patients treated occurred gradually, not as a direct result of splenectomy but as the patients' general health improved. Iron, vitamin B_{12}, folic acid, hormones, and blood transfusions can only be considered ancillary therapy. In the patients reported, the response to corticotropin (ACTH) was poor. Blood transfusion proved to be the most important therapeutic aid in permitting the patient to undergo surgery.

PROSTATIC CARCINOMA: TREATMENT OF ADVANCED CASES WITH INTRAVENOUS DIETHYLSTILBESTROL DIPHOSPHATE.

Flocks, R. H.; Marberger, H.; Begley, B. J., and Prendergast, L. J. *J. Urol.* **74:** 549 (Oct.) 1955.

Diethylstilbestrol diphosphate, an intravenous, well tolerated estrogen was tested in 66 patients with proven prostatic carcinoma, 34 of whom had failed to respond or had become refractory to the usual estrogens. The average dose was 500 mg. given in an intravenous infusion of isotonic saline or dextrose, 5 per cent in water, the total volume of which was 200 to 500 ml. The rate of infusion averaged 300 ml. per hour. One or two infusions were given daily for five to twenty days. In only 1 patient was there improvement of evident metastases (present in 39 patients). Softening and decrease in the size of the gland occurred in 7 of 46 patients with advanced prostatic carcinoma. Among 31 patients with elevated serum acid phosphatase levels, a decrease or temporary return to normal occurred in 20, whereas a further elevation was noted in 4. Subjectively there was much improvement in bone pain, urinary symptoms, and general well being. High blood levels were obtained by this therapy. In some patients an additional effect over that of ordinary estrogen therapy could be obtained. Further studies are indicated.

RHEUMATOID ARTHRITIS AND PSORIASIS.

Gribble, M. de G. *Ann. Rheumat. Dis.* **14:** 198 (June) 1955.

It does not appear justifiable to consider "psoriatic arthritis" as a distinct naturally occurring syndrome. The descriptions that have been suggested are based on certain arbitrarily selected characteristics, but since no single one can account for the excess of rheumatoid arthritis patients who also have psoriasis, they appear to serve no useful purpose. One must therefore conclude that the most that can reasonably be claimed is that rheumatoid arthritis patients seem to be unusually prone to psoriasis, and that when they have both diseases, the arthritis may often take one of its less usual forms; the commonest of these is bony destruction in the hands. The psoriasis also appears unusual in its late onset, and in the high incidence of nail involvement. Since the term "psoriatic arthritis" varies so widely in its meaning from one writer to another, it should be discarded but, in recognition of the frequency with which psoriasis occurs in rheumatoid arthritis (3 to 4 per cent) and the unusual forms that the arthritis may take, it would be well to specify that the patient suffering from both diseases has "rheumatoid arthritis *with* psoriasis." (Author's conclusions.)

THROMBOSIS OF PULMONARY ARTERIES.

Keating, D. R. *Am. J. Surg.* **90:** 447 (Sept.) 1955.

The antemortem diagnosis of thrombosis of the pulmonary artery and its branches is now possible, as a clinical syndrome of the disease has evolved. Large thrombi can exist

for long periods in the pulmonary artery, or its branches, or both, and cause little disability. This apparently is due to slow progression in size, the occurrence of recanalization, and limitation in number of the large arterial branches involved. The syndrome does not occur frequently, but more than 100 cases have been recorded. These thrombi arise either locally or are the result of emboli which originate in systemic veins. They may complicate carcinoma of the lung, pulmonary tuberculosis, pneumoconiosis, and congenital and acquired heart disease. The symptoms resemble those of congestive failure, typically of the right heart. Dyspnea may be present, but clubbing, cyanosis, and polycythemia are uncommon. Pulmonary embolism may occur in the course of the disease as a result of the detachment of thrombi. Diagnosis is made primarily by radiographic examination of the chest. It is based on the discovery of enlargement of one or more vessels in the hilar regions or enlargement of the pulmonary artery itself. The thrombosed artery has little motion and produces sharp, clear images on the film. It has an elliptic configuration tapering at the distal point of thrombotic closure. Distal to the point of thrombosis, the lung segment shows reduced radiability because of diminished blood flow. The differential diagnosis includes mediastinal mass lesions, notably carcinoma with check-valve obstruction of the bronchus, as well as other causes of pulmonary arterial dilatation. The electrocardiogram shows right ventricular hypertrophy. Angiocardiograms are an aid to diagnosis. Normal opacification of the peripheral pulmonary arteries does not occur. Death is sudden and unexpected. Four case reports are added to the original 7 verified by necropsy.

SOME OBSERVATIONS ON 520 GOUTY PATIENTS.

Kuzell, W. C.; Schaffarzick, R. W.; Naugler, W. E.; Koets, P.; Mankle, E. A.; Brown, B., and Champlin, B. *J. Chron. Dis.* **2:** 645 (Dec.) 1955.

A clinical analysis of 504 examples of primary and 16 of secondary gout was made. The group included 373 males and 131 females with primary gout. Visible tophi were present in 13 per cent of males and 3.8 per cent of females. Initial serum uric acid determinations were below 6 mg. per 100 ml. in 27.5 per cent of males and in 41 per cent of females. These determinations were often made following medication with uricosuric agents. Comparison of colorimetric and enzymatic (uricase) estimations of serum uric acid revealed no practical advantage in favor of the latter. The coincidence of other diseases is recorded. The cause of death in 18 gouty patients is reported (a myocardial infarct occurred in 11). Alcoholism and uremia were observed much less frequently than is commonly presumed. Special laboratory investigations in a few of these patients included "atherogenic indices" which were generally elevated. Serum glutamine and glutathione levels were all within the normal range. For the treatment of acute gouty arthritis, effective agents included colchicine, corticotropin, demecolcine, and phenylbutazone. As an adjunct measure, the local injection of hydrocortisone was valuable. Less effective and often actually aggravating were oral cortisone, hydrocortisone, and metacortandracin. In the management of chronic gouty arthritis, phenylbutazone and probenecid, singly or in combination, appeared to be of greatest merit. Of the currently available antigout agents, phenylbutazone is the single most effective remedy, valuable at once in the termination of acute gouty arthritis, prevention of acute exacerbations, and the control of chronic gouty arthritis. The undesirable side effects of the various antigout agents are discussed. (Authors' summary.)

THE LIVER IN RHEUMATOID ARTHRITIS.

Lefkovits, A. M., and Farrow, I. J. *Ann. Rheumat. Dis.* **14:** 162 (June) 1955.

Liver function tests were performed in 100 patients with rheumatoid arthritis. Eighty-six patients had peripheral joint involvement and 9 of them spinal involvement as well. In 14 patients only the spine was involved. Liver tissue was obtained for histologic examination by biopsy in 12 patients and at necropsy from the 3 who died. A definite relationship existed between the severity of the disease and the frequency of abnormal results. Elevation of the serum globulin level and depression of the serum albumin level were the

abnormalities most frequently found. Abnormal values were also observed in determinations of cholesterol concentration, cephalin flocculation, and thymol turbidity. Other tests did not indicate abnormalities in a sufficient number of patients to be of statistical significance. Histologic study of liver tissue revealed abnormal morphologic alterations in 2 of the available 15 specimens. These were chiefly variations in the size and pigmentation of the nuclei of the liver cells, slight prominence of the peripheral fibrous tissue with slight but varying degrees of round-cell infiltration and, occasionally, a slight increase of fat. In none of the 3 liver specimens obtained at necropsy were there any significant abnormalities. The lack of correlation between the clinical and laboratory evidence of liver involvement and the histologic appearance of liver tissue is briefly discussed. The results of this study are concluded to justify the opinion that some of the functions of the liver are pathologically altered in patients with rheumatoid arthritis.

CIRCULATORY DYNAMICS IN OSTEITIS DEFORMANS.

Lequime, J., and Denolin, H. *Circulation* **12:** 215 (Aug.) 1955.

Several years' study of circulatory modifications in Paget's disease has confirmed the existence of an increase in peripheral blood flow in the limbs affected by the disease. The increase is insufficient, however, to increase the cardiac output of patients at rest. During exercise, an abnormally high increase in cardiac output occurs. This suggests that the circulation in the bone affected by Paget's disease increases considerably during effort and thus enables an important amount of blood to return prematurely to the right heart. These findings are similar to those observed in patients with systemic arteriovenous aneurysms. It is likely that important changes in hemodynamics are exceptional and may be found only in very severe and active forms of the disease.

CARCINOMA OF THE PROSTATE AFTER SUPRAPUBIC PROSTATECTOMY.

McCrea, L. E., and Karafin, L. *J. Urol.* **74:** 552 (Oct.) 1955.

Among 328 patients with carcinoma of the prostate seen between 1936 and 1954, the carcinoma developed in 14 (4.3 per cent) following suprapubic prostatectomy for benign hyperplasia. On the basis of this and other investigations reported in the literature, it is estimated that clinical carcinoma will develop in an average of six years postoperatively in 3 per cent of patients undergoing subtotal prostatectomy. In a series of 495 individuals subjected to suprapubic prostatectomy, carcinoma was found upon pathologic examination in 32 (6.5 per cent) who preoperatively were thought to have benign hyperplasia. It is suggested that serial section of all surgical specimens be made routinely in order to avoid missing a diagnosis of carcinoma in cases considered to be benign hyperplasia. It is *not* recommended that perineal biopsy be carried out before prostatectomy in every case of prostatic hyperplasia, nor that radical prostatectomy be performed when latent or occult carcinoma is demonstrated pathologically.

PREVENTION AND TREATMENT OF THROMBOPHLEBITIS AND PULMONARY EMBOLISM IN GENITOURINARY SURGERY.

Mathé, C. P., and Salomon, E. *J. Urol.* **74:** 820 (Dec.) 1955.

Prophylactic measures to minimize the occurrence of pulmonary embolism consist of: elevation of the foot of the bed and passive and active exercise immediately after operations on the genito-urinary tract and on veins; early ambulation to maintain the increased venous return flow thus established; antibiotic therapy; and the early treatment of thrombophlebitis and phlebothrombosis. Besides increasing the venous flow before the patient is ambulant, these measures eliminate pooling of blood, lessen the likelihood of development and propagation of a clot, and minimize the possibility of detachment of a large fatal embolus. Patients with signs and symptoms suggestive of pulmonary embolism—sudden onset of pain in the chest, cough, hemoptysis, and febrile reaction occurring within two

weeks after operation—should be examined radiographically for evidence of emboli, care being taken to differentiate bronchial pneumonia, pleuritis with effusion, and atelectasis. In phlebothrombosis, the aseptic clot is likely to occlude a large vessel and produce diffuse, noncircumscribed and nonspherical density which usually involves a lobule of the lung. As its shape becomes demarcated, it looks like a pyramid with the apex pointing to the hilus. The infectious nature of thrombophlebitis is shown by clinical studies. The area of increased density usually occurs in the periphery of the lung and tends to spread. The infarct resulting from the embolus gives rise to pleural effusion. Radiographically, an uncircumscribed shadow can be seen, which fades into well aerated lung tissue. The treatment for acute thrombophlebitis and phlebothrombosis is elevation of the foot of the bed, heparinization, application of heat or cold, bandaging of the affected limb, antibiotic therapy, and passive and active exercise. Nonfatal pulmonary embolism is treated with anticoagulant and antibiotic drugs, the administration of oxygen, and papaverine and atropine intravenously to combat retrosternal pain. High ligation of the femoral vein should be performed in patients with repeated pulmonary embolism. An analysis of 9,005 major operations in a three-year period showed an incidence of 0.19 per cent for pulmonary embolism. The incidence among 1,001 operations on the genito-urinary tract was 0.59 per cent. When the preventive measures described were used in 337 patients, there were only 2 instances of nonfatal pulmonary embolism. There were 4 instances, 2 of them fatal, among 664 patients in whom preventive measures were not used. Among older-age patients, 2 pulmonary emboli (1.3 per cent), 1 of them fatal, followed 193 prostatic operations in which the Trendelenburg position was not used postoperatively. One nonfatal embolism (0.71 per cent) occurred among 134 patients when this position was used. Among 382 operations on veins of the leg, nonfatal pulmonary embolism occurred twice (0.52 per cent), and in these instances the foot of the bed was not elevated postoperatively. When it was elevated after 1,500 similar operations, only 1 minor case of embolism occurred.

LUMBAR SYMPATHECTOMY IN THE TREATMENT OF HYPERTENSIVE ISCHEMIC ULCERS OF THE LEG (MARTORELL'S SYNDROME).

Palou, J. *Circulation* **12:** 239 (Aug.) 1955.

Lumbar sympathectomy was performed in 4 patients with hypertensive ulcers of the leg. Pain was relieved and the ulcers healed within six weeks to two months. Painful ulcers on the anterolateral aspect of the leg in some patients with diastolic arterial hypertension are due to ischemia caused by obliterating lesions of the small arterioles. An increase in the thickness of the arteriolar wall and a decrease in the diameter of the lumen are the most common vascular changes. The lesions are specific to hypertensive disease. There is subendothelial hyalinosis in some instances; in others, there is thickening and an increased number of nuclei in the media. The lesions may be initiated with or without local trauma. The first symptom is likely to be a painful red patch that becomes blue and purpuric. Superficial necrosis develops and finally, ulceration, which is often bilateral and symmetrical. There is no history of thrombophlebitis and no varicose veins are present. The ulcer becomes painful and the pain is not relieved by rest in bed.

TRANSRECTAL BIOPSY OF THE PROSTATE.

Pearlman, C. K. *J. Urol.* **74:** 387 (Sept.) 1955.

The need for a more accurate diagnostic method in prostatic carcinoma is stressed. The shortcomings of needle biopsy, transurethral biopsy, and biopsy through perineal exposure of the prostate are outlined. Transrectal biopsy has now been performed in 40 patients and has proved equally as accurate as open perineal biopsy. The technic, which is simple, is described. The procedure takes only a short time. Prior sterilization of the bowel with neomycin is recommended. Suspicious areas of the prostate are readily accessible and can

be visualized. Adequate tissue for histologic examination can be removed with a pituitary rongeur. No interference with sexual activities has occurred. Definitive surgery is possible following the procedure. However, if a diagnosis is suspected of early carcinoma of the prostate amenable to radical surgery, open perineal exposure with frozen-section biopsy is still the method of choice. Better delineation of the cleavage plane between the rectum and the prostate is obtained by the perineal approach. The transrectal procedure should not be followed by radical retropubic prostatectomy. In 1 patient in whom this operation was performed, a vesicorectal cutaneous fistula developed. The posterior surface of the prostate apparently adhered to the rectum as a result of the previous biopsy. The other complications in this series of patients were 2 instances of epididymitis in elderly patients without bowel preparation, and 2 of bleeding from the operative site. Bleeding in one of these patients ceased spontaneously, but in the other the rectal incision had to be resutured. The possibility of implantation of cancer cells in the rectum by the transrectal procedure has not yet been ruled out.

OCCLUSIVE AURICULAR THROMBI.

Read, J. L.; Porter, R. R.; Russi, S., and Kriz, J. R. *Circulation* **12:** 250 (Aug.) 1955.

A review of the pertinent literature has been presented along with the clinicopathologic findings in 4 new cases of occlusive auricular thrombi. Occlusive thrombi have been subdivided into 1) ball-valve thrombi, 2) pedunculated thrombi, and 3) massive thrombi. Patients with occlusive thrombi present a reasonably definitive symptom complex, manifested by peripheral and/or cerebrovascular manifestations, which are prone to be repetitive and variable. The murmurs occasionally wax and wane and all of the symptoms may be precipitated in some cases by postural variations. Two of the cases reported are notable in that one is the first reported case of pedunculated thrombus of the right auricle and the other is a case of ball thrombus occurring in a patient without mitral stenosis or rheumatic heart disease. (From authors' summary.)

LIVER FUNCTION IN RELATION TO POSSIBLE ABNORMALITIES OF STEROID METABOLISM IN RHEUMATOID ARTHRITIS.

Roy, L. M. H.; Wigzell, F. W.; Demers, R.; Sinclair, R. J. G.; Duthie, J. J. R.; Atherden, S. M., and Marrian, G. F. *Ann. Rheumat. Dis.* **14:** 183 (June) 1955.

A comparison was made of the results of routine tests of liver function in 29 patients with rheumatoid arthritis and 15 patients from a medical ward. There was no evidence of abnormality in the metabolism of bile pigment, excretion, detoxification, or enzyme activity in the liver in either group. In rheumatoid arthritis patients, the plasma protein pattern was abnormal. There was a marked increase in fibrinogen, a reduction in the A/G ratio, a decrease in the alpha and beta globulins, and an increase in gamma globulin. The zinc and thymol turbidity tests yielded positive results in most of the rheumatoid arthritis patients. There was no significant change in urinary amino acids. These signs of disturbed protein metabolism were not considered necessarily to arise from altered liver function. Mild impairment of carbohydrate metabolism in the liver was suggested by delay in the clearance of fructose from the blood. No consistent difference between normal subjects and rheumatoid arthritis patients in the urinary excretion of pregnanediol after the intramuscular injection of progesterone was demonstrated. In view of this finding and the lack of satisfactory evidence of impairment of liver function, the concept of an association between abnormal metabolism of progesterone and impaired liver function in rheumatoid arthritis must be abandoned.

LONG-ACTING CORONARY VASODILATOR DRUGS: METAMINE, PAVERIL, NITROGLYN AND PERITRATE.

Russek, H. I.; Zohman, B. L.; Drumm, A. E.; Weingarten, W., and Dorset, V. J. *Circulation* **12:** 169 (Aug.) 1955.

An objective test—the ability of vasodilators to modify the electrocardiographic response to standard exercise (Master two-step test) in carefully selected patients—was used to evaluate four of these agents in the treatment of angina pectoris. Each drug was tested in 21 patients in whom control records obtained after standard exercise remained relatively constant from day to day. Metamine (triethanolamine trinitrate biphosphate) in an oral dosage of 2 to 6 mg. produced little or no significant effect on exercise response as measured electrocardiographically. Paveril (dioxyline phosphate), the synthetic analog of papaverine, administered orally in doses of 200 to 500 mg. in 6 of 21 patients was mildly effective but its action was not sustained and its influence not striking even in massive dosage. It appeared to be much less potent than papaverine by this method of testing. Nitroglyn, containing specially coated granules of glyceryl trinitrate (nitroglycerine), in the usual dose of 2.4 mg. ($\frac{1}{25}$ grain) appeared totally inert. With doses of 4.8 to 9.6 mg. ($\frac{2}{25}$ to $\frac{4}{25}$ grain), Nitroglyn produced slight to moderate improvement in exercise response for a period of six hours following its administration in 13 of the patients tested, but it failed to induce a normal electrocardiographic response to exercise in any of the 21 patients. This result was far inferior to those with the sublingual administration of nitroglycerine and Peritrate, respectively. Peritrate, in a dose of 10 to 20 mg. orally, exerted a marked modifying influence on the electrocardiographic response to standard exercise in 14 of the 21 patients tested. In almost all of these patients the results were comparable to those obtained with glyceryl trinitrate, but the duration of action was considerably more prolonged. Its effect could be demonstrated five to six hours after administration. The clinical response was markedly attenuated or abolished if Peritrate was taken after food. Peritrate was the only drug of the four tested to merit the designation of "long-acting coronary vasodilator." It appears to satisfy the need for prolonged coronary vasodilatation in patients with angina pectoris.

MASSIVE HEMORRHAGE DUE TO DIVERTICULA OF THE COLON.

Stanton, A. *Am. J. Gastroenterol.* **24:** 77 (July) 1955.

Diverticula of the colon occur in 5 to 10 per cent of individuals over 45 years of age. Diverticulitis is present in about 15 per cent of these. Diverticular disease of the colon is now more frequently diagnosed because of improved methods and widespread use of x-ray examination of the intestinal tract. Diverticula can occur anywhere in the gastro-intestinal tract, but in about 35 per cent of cases they are confined to the sigmoid colon and in another 40 per cent they are scattered throughout the colon. Diverticulosis and diverticulitis are often associated with massive rectal hemorrhage. The recorded incidence of bleeding is from 4 to 30 per cent. Any elderly patient with lower abdominal pain, especially left-sided, and constipation or diarrhea should be suspected of having diverticulitis. Peritonitis, abscess, intestinal obstruction, fistula formation, and occult, gross, or massive rectal hemorrhage in the elderly also suggest diverticulitis. The loss of a substantial amount of blood is accompanied by symptoms of shock and such evidence as pallor, lowered blood pressure, and a low level of hemoglobin. The recognition that massive rectal hemorrhage may be associated with diverticula of the colon is necessary for proper treatment. Malignancy must first be considered. X-ray films of the gastro-intestinal tract can be taken when the patient's condition permits. Arteriosclerosis and hypertension are frequent incidental findings in patients with hemorrhage due to diverticula and may play a part in the etiology of the bleeding. Other sources of bleeding, such as carcinoma, hemangioma or other tumor, may be coexistent with diverticula. The treatment usually is supportive and symptomatic, with administration of blood and fluids. Surgery may be indicated in cases of recurrent

rectal hemorrhage. Fourteen cases of massive hemorrhage due to diverticula of the colon are reported. Additional therapy in these patients consisted of sedatives, Demerol or morphine for the relief of pain, iron and vitamins as indicated, digitalis and mercurials for cardiac conditions and congestive heart failure, and antibiotics.

HEBERDEN ORATION. HEBERDEN'S NODES. A CLINICAL DESCRIPTION OF OSTEOARTHRITIS OF THE FINGER JOINTS.

Stecher, R. M. *Ann. Rheumat. Dis.* **14:** 1 (March) 1955.

This discussion of Heberden's nodes deals with incidence, familial involvement, mode of inheritance, gene frequency analysis, paternal inheritance, double inheritance, association with other forms of arthritis, association with the menopause, the importance of the nerve supply, other clinical features such as blood pressure, obesity, roentgenologic appearance, and trauma, and a study in a large family with a high incidence of Heberden's nodes. The author concludes that idiopathic Heberden's nodes may occur without clinical evidence of other osteoarthritis. Involvement of the knees, hips, and spine does occur, but no more frequently than in any group of women of comparable age. Experience with osteoarthritis of the finger joints, hips, and spine suggests that three separate diseases have been confused by giving them the same name. Therapy in Heberden's nodes is ineffective and patients should be told that they have a hereditary disease that develops at the menopause. Pain during the time of development when the fingers are sensitive can be minimized with aspirin. The patient should also be told that the nodes do not indicate the development of a crippling disease. Information about this type of osteoarthritis is not directly applicable to other forms but may be a means for better understanding of the more serious forms of the disease.

GASTROINTESTINAL HEMORRHAGE: THERAPEUTIC EVALUATION OF BIO-FLAVONOIDS. REPORT ON 55 CASES.

Weiss, S.; Weiss, J., and Weiss, B. *Am. J. Gastroenterol.* **24:** 523 (Nov.) 1955.

Because of evidence that the hemorrhage in peptic ulcer and other gastro-intestinal bleeding may be due to deficiencies in circulation in the intestinal mucous membrane, a study was undertaken of the use of vitamin P, also known as permeability factor or bio-flavonoids. The beneficial effect of bio-flavonoids on capillary activity has been attributed by various investigators to anti-inflammatory properties. The preparation used was CVP, containing 100 mg. each of natural citrus flavonoid complex and ascorbic acid. Fifty-three patients with gastro-intestinal hemorrhage and 2 with epistaxis were treated. The daily dosage ranged from 300 to 600 mg. (flavonoid content). Bleeding duodenal ulcer in 16 patients responded satisfactorily. Bleeding was arrested in 2 cases of gastric ulcer. CVP was also beneficial in rectal and hemorrhoidal bleeding, in 1 patient with gastric hyperacidity with erosion, and in bleeding in 3 patients with diverticula of the colon. Two cases of epistaxis, 1 of which was due to hypertension, responded promptly. In bleeding mucous and ulcerative colitis, the results were good in 13 patients but negative in 4 others. One of 3 patients with infectious hepatitis with jaundice and epistaxis responded satisfactorily but the other 2 did not. There was no improvement in 1 patient with duodenal cicatrized ulcer with gastric obstruction, 1 patient with anal fissure, and 1 patient with rectal bleeding following surgery for carcinoma. In 1 instance, anal pruritus induced by antibiotics was relieved by CVP. The beneficial effects of bio-flavonoids in gastro-intestinal hemorrhage deserve further investigation.

THE EFFECTS OF PROSTATIC SURGERY ON THE LEVEL OF SERUM ACID GLYCEROPHOSPHATASE.

Whitmore, W. F., Jr., and Woodward, H. Q. *J. Urol.* **74:** 809 (Dec.) 1955.

A study in 26 patients indicates that trauma to either the benign or the cancerous prostate may result in elevation of the serum acid phosphatase level. Elevations in association

with surgical trauma occurred in 20 patients—in 3 of 6 with prostatic carcinoma and in 17 of 20 with benign prostatic disease. The serum acid phosphatase levels were found to increase for several hours following the inciting trauma. Residual prostatic tissue was present in each patient, as no total prostatectomies were performed. A return to the preoperative level occurred within twenty-four hours after operation. In 2 patients, studied in detail, the preoperative level was reached in twelve to sixteen hours. It is assumed that the posttraumatic elevation in serum acid phosphatase concentration results from a "leak" of prostatic acid phosphatase into the circulation, although this has not been definitely established.

GENETIC FACTORS IN THE DISEASES OF LATER LIFE.

Zeman, F. D. *J. Chron. Dis.* **2:** 11 (July) 1955.

This review considers genetic factors related to the diseases of later life. Their relation to each of the following is discussed: metabolism; the cardiovascular system; diseases of the blood; allergic, musculoskeletal, cutaneous, neurologic, and mental disorders; and the special sense organs. The discussion covers such rare, genetically determined pathologic processes encountered in middle and old age as alkaptonuria, hemorrhagic telangiectasis, Gaucher's disease, and polycystic kidneys, as well as some commonly encountered—diabetes, gout, essential hypertension, allergic reactions, pernicious anemia, psychoses and psychoneuroses. The interrelations between heredity, longevity, and aging on the one hand, and benign and malignant neoplasia on the other hand, are considered. Needs are cited for further laboratory and clinical investigation of genetic influences, the development of a means for the detection of genetic carriers, the detection of the mild, masked, modified and atypical forms of more clearly defined syndromes, and for preventive measures in those conditions amenable to specific treatment. The search for genetic influences is another facet in the study of disease in the aged.

NEWS AND NOTICES

NINTH INTERNATIONAL CONGRESS ON RHEUMATIC DISEASES

The Ninth International Congress on Rheumatic Diseases will be held at the Royal York Hotel, Toronto, Ontario, Canada, from *June 23 to 28, 1957*. This quadrennial function of La Ligue Internationale contre le Rhumatisme will be held under the auspices of the Canadian Rheumatism Association.

The Program Committee invites contributions to the scientific programme of the Congress and is anxious to receive reports on current clinical or basic research dealing with any aspect of the rheumatic diseases.

Those offering papers for consideration should submit a 200 to 300 word abstract not later than *January 1, 1957*. Abstracts should be submitted in triplicate in the language in which the paper is to be read. If an abstract is submitted in a language other than English, it will be helpful, though not essential, if it can be accompanied by an English translation.

All correspondence should be directed to:

The Ninth International Congress on Rheumatic Diseases,
Post Office Box 237,
Terminal "A,"
Toronto, Ontario, Canada

NEW HOSPITAL FOR THE CHRONICALLY ILL AND AGED

The Fort Lauderdale Beach Hospital, Fort Lauderdale, Florida, is scheduled to be opened about May 1, 1957. A group of physicians and laymen will convert the Blue Water Hotel into a 100-bed hospital for the chronically ill and aged. Dr. Louis L. Amato, a local geriatrician, heads the group of buyers.

There will be emphasis on restorative and rehabilitative techniques. The hospital will have laboratory, x-ray, physiotherapy and rehabilitative departments. It will be equipped to receive all cases except those involving major surgery, obstetrics, mental disorders, drug addiction and infectious diseases. It will include a Senior Center, offering recreational, educational and counseling programs for older persons. All doctors who are members of the Broward County Medical Society will be invited to participate in organizing the medical staff. The hospital will have a full-time rehabilitation specialist, a resident physician, and a staff of 65 others.

NEW YORK HEART ASSOCIATION CONFERENCE

Dr. Paul Dudley White and other prominent cardiologists and notables in the public health field will participate in a one-day "Conference on Atherosclerosis and Coronary Heart Disease" at the Waldorf-Astoria in *New York City, Tuesday, January 15, 1957*. The conference is being sponsored by the New York Heart Association. Dr. Robert L. Levy is chairman of the steering committee.

Speakers, in addition to Dr. White, include:

Dr. E. Cowles Andrus, Associate Professor of Medicine, Johns Hopkins University; Dr. Ancel Keys, Director of the Laboratory of Physiological Hygiene and Professor in the School of Public Health, University of Minnesota; Dr. Howard B. Burchell, Professor of Medicine, Mayo Foundation Graduate School, University of Minnesota.

Also, Mr. Edward A. Lew, Actuary and Statistician, Metropolitan Life; Dr. Howard A. Rusk, Professor and Chairman, Department of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center; Dr. Herman E. Hilleboe, Commissioner of Health, State of New York; Dr. William H. Stewart, Assistant Director, National Heart Institute; Miss Ellen J. Walsh, Assistant Chief, Social Service Department, Clinical Center, National Institutes of Health; Miss Margaret Denham, Public Health Nursing Consultant, Heart Disease Control Program, Department of Health, Education and Welfare, United States Public Health Service.

Dr. Levy will preside at the morning session and Dr. A. Wilbur Duryee, president of the New York Heart Association at the luncheon session. Dr. Wilson G. Smillie will chair the afternoon session.

A similar conference held last year on "Rheumatic Fever and Rheumatic Heart Disease" evoked considerable interest in scientific as well as lay circles. The New York Heart Association's first full-day conference concerned cardiacs in industry and was held in 1953.